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gactactcag ctgaaaacca agaacgtgta gcagatgcct acgttgacag acgttacggt	540
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 <211> 2232
 <212> DNA
 <213> Streptococcus pneumoniae

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<210> 8
 <211> 567
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 <213> Streptococcus pneumoniae

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 gctcgtaaat tggcaggttt caaacttgaa acaaaactat tgagcgcaac ggaacttcaa 420
 acaacgacta gttttgattt tcaagttctg gatgtcaaga aggcctccca gttggaacat 480
 ctgaagaata ttggtttgga aaatcttttg aaaaatgaac caagcaaata tatttcagat 540
 agattggcaa atggcgcgac agaaca 567

<210> 9
 <211> 1248
 <212> DNA
 <213> Streptococcus pneumoniae

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 cacgtaacag ggactaatgg gaaaggatct accattgctt ttatgagggg attattttatg 180
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 <211> 831
 <212> DNA
 <213> Streptococcus pneumoniae

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<210> 11
 <211> 267
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 11		
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gtttaccgca	aatttggctc	gagtcgtatc gcttttcgcy aacttgcgca taaagggtcaa 240
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<210> 12
 <211> 1335
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 12
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 gcggagaaaa tctatcaaaa aattacgaca aaggcggcta atttagtagc tgttggtgat 180
 gaaattgcgg ctgagttggg aattcctatc gttaataagc gtgtatcggt gacacctatt 240
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<210> 13
 <211> 2436
 <212> DNA
 <213> Streptococcus pneumoniae

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 <213> Streptococcus pneumoniae

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 <211> 999
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 <213> Streptococcus pneumoniae

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 <211> 5301
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 16	
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 <213> Streptococcus pneumoniae

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<213> Streptococcus pneumoniae

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<211> 1881

<212> DNA

<213> Streptococcus pneumoniae

<400> 42

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 <213> Streptococcus pneumoniae

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 <213> Streptococcus pneumoniae

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 <213> Streptococcus pneumoniae

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<213> *Streptococcus pneumoniae*

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<213> Streptococcus pneumoniae

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ggtccagggt tccgtcattt tgaaacctat attgaagatt tgcagtatgc caaaggcaat   1140
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caatcaggag atatggttcg tgcattaaaa gaaggactca tcaatcttta taagggaagat   1260
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<210> 59

<211> 840

<212> DNA

<213> Streptococcus pneumoniae

<400> 59

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cgtcatattg atacggcggc gatttatcag aatgaagaaa gtgttggtca agcaatcaaa    180
gatagcggag ttccacgtga agaaatgttc gtaactacca agctttggaa tagtcagcaa    240
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ttggatttgt atttgattca ttggccgaac ccaaaaccgc tcagagaaaa tgacgcatgg	360
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<210> 60
 <211> 1653
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 60	
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atcagagata catcacgtcg tagccgtaga gaaggagcaa aacccgttaa gcctaagaaa	540
gagaagaagt cacatgtgaa agctttttgt atttcatcc ttgtattcct tgccttgctc	600
tcagcaggtg gttactttgg ttaccagtac gtgctagatt ctttattacc tatcgatgct	660
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<210> 61
 <211> 615
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 61		
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accagaatga	cagaa	615

<210> 62
 <211> 1956
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 62	
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ttaaccggta	caaaaggggt	tgaatcatat	aaatacctca	aagtacaaga	taagattgtc	1860
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aaaaaagccc	aagaagaatt	ggcaaaacat	gtcaaa			1956

<210> 63
 <211> 1518
 <212> DNA
 <213> Streptococcus pneumoniae

1028462_1.TXT

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<400> 63
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gatggggatt attatgtaaa ggatgatggt tctaaagctc aaagtgaatg gatttttgac 300
aactactata aggcttggtt ttatattaat tcagatggtc gttactcgca gaatgaatgg 360
catggaaatt actacctgaa atcaggtgga tatatggccc aaaacgagtg gatctatgac 420
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gatccagcct attctgccta tttttatcta aaatccgatg gaacttatgc taaccaagag 660
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<210> 64
<211> 474
<212> DNA
<213> Streptococcus pneumoniae

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<400> 64
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gcagctattg ccgctcgtgc aggaatctcc attgctcagt tagaggcctt gaatcctggg	420
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<210> 65
 <211> 786
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 65 atgccaatta catcattaga aataaaggac aagacttttg gaactcgatt cagaggtttt	60
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<210> 66
 <211> 537
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 66 atgtctttaa aagatagatt ctagatagatt atagattatt ttacggagga tgaggattca	60
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ccggtctcc caatgaatc accttcacag tcggctggca caaaagagaa caatatcacc	180
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<210> 67
 <211> 915
 <212> DNA
 <213> Streptococcus pneumoniae

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<210> 68
 <211> 2091
 <212> DNA
 <213> Streptococcus pneumoniae

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	cctatttttc	aaggagggtc	atatcaactg	aacaataaga	gtatagatat	cagctctttg	180

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<210> 69
 <211> 2884
 <212> DNA
 <213> Streptococcus pneumoniae

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<210> 77

<211> 954

<212> DNA

<213> Streptococcus pneumoniae

<400> 77

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 <212> DNA
 <213> Streptococcus pneumoniae

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gtttctcatc	tagataatag
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gtttctcatc	tagataatag
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<210> 79
 <211> 924
 <212> DNA
 <213> Streptococcus pneumoniae

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gggaagctct gggatgccca acctcataac attgaggcct ttaccgcagg taaggttgtc	180
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<210> 80
 <211> 663

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<212> DNA

<213> Streptococcus pneumoniae

<400> 80

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<210> 81

<211> 1008

<212> DNA

<213> Streptococcus pneumoniae

<400> 81

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tcacgcttta cccgtccaaa cttgacaacg attgcccaac ctctttatga ccttggtgcc	900
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<210> 82
 <211> 1407
 <212> DNA
 <213> Streptococcus pneumoniae

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tacaccgaag atttccactt gatgaaggaa attggagtta attctttccg cacttccatc	240
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<210> 83

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<211> 408
<212> DNA
<213> Streptococcus pneumoniae

<400> 83
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<210> 84
<211> 621
<212> DNA
<213> Streptococcus pneumoniae

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cagactagcc agtggatgaa tcaggcccag cgtttgagac cacatttttg ggtttatcta 240
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aaggtagaaa gtcaagaagt tcgaaaagtt ttagtgaagg tagatgttcc tatgacagaa 540
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<210> 85
<211> 459
<212> DNA
<213> Streptococcus pneumoniae

<400> 85
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<210> 86
 <211> 324
 <212> DNA
 <213> Streptococcus pneumoniae

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<210> 87
 <211> 897
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 87	
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<210> 88
 <211> 2463
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 88
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aaaggcattg	acttgaattt	acaagcttca	gctctgaaat	tgtagcaaaa	tcaaggatat	2280
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<210> 97
 <211> 1344
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 97						
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tattccagag	gaaatggatc	gattgcgcgt	ggggatgatt	atcctgctta	ttataaaaaat	180
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tggggacatc	gtgctcgtcg	ggaaggttat	cggtgtagata	atacaccgac	gatttggttcc	360
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gatcagattg agattgagga atataactat ggttatacag aatcctataa taaacgagtt	480
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attaaaaactg aacctctagc tagcggaact gtgattgatt actattatcc tggggagaag	660
gttcattatg atcagatact tgaaaaagac ggcataagt ggttgagtta tactgcctat	720
aatggaagct atcgttatgt tcaattggag gctgtgaata aaaatcctct aggtaattct	780
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atctctagct atggatccca tagtagttca actgtcgggtt ggaagaaat aaatggtagt	1080
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 <211> 450
 <212> DNA
 <213> Streptococcus pneumoniae

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gctcaagctg taggtgaact tcgtggtaaa caaaaatcgg aagaaaaagc tcacgctgag	180
atgattgcag aaggaaaagc aattaagca caacttgaag cagaagaac tgtttagaaa	240
tttgttagaa aagttgggtc agatggtcgt accttgggt ctattacca taagaagatt	300
gcagaagaat tgcaaaagca atttgaatt aagattgata aacgtcatat tcaagtacaa	360
gtctccgattc gagcgggttg tttgattgat gtgccagtga aaatctatca agatatcaca	420
agtgtaatca atcttcgtgt gaaagaagga	450

<210> 99
 <211> 1176
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 99	
atgaagaaaa aaatcttagc gtcactttta ttaagtacag taatggtttc tcaagtagct	60

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caagtatcag	ctattcaagc	tgagcagctc	aacttgcaag	ctgaaaatga	tagattacaa		240
gcagaatcta	agaaactcga	gggtgagatt	acagaacttt	ctaaaaacat	tgtttctcgt		300
aaccaatcgt	tggaaaaaca	agctcgtagt	gctcaaacaa	atggagccgt	aactagctat		360
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agtgaatcgt	tatctgcaaa	caacaaaaatg	ttagaacaac	aaaaggcaga	taaaaaagct		480
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aaattggctg	atgatgctca	agcattgact	acgaaacagg	cagaactaaa	agctgctgaa		600
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tcaaattatg	caggtaatcg	tacaattgga	aatcacctgt	gatggttcaa	tccaacaaca	1140	
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<210> 100
 <211> 387
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 100	
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aaaaagttgt	tgttcctgag
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accaagggaac	agatgtagca
	120
gtagaaccag	ctaagcagtt
tgctccaaca	acagactgga
aacaagaaaa	tggtatgtgg
	180
tatttttata	atactgatgg
ttccatggca	acaggttggg
tacaagttaa	tagttcatgg
	240
tactacctca	acagcaacgg
ttctatgaaa	gtcaatcaat
ggttccaagt	tggtgggtaa
	300
tggtattatg	taaatacatc
gggtgagtta	gcgggtcaata
caagtataga	tggtataga
	360
gtcaatgata	atgggtgaatg
gggtgcgt	
	387

<210> 101
 <211> 138

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<212> DNA
 <213> Streptococcus pneumoniae
 <400> 101
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 aggacgacca tgggtcag 138
 <210> 102
 <211> 93
 <212> DNA
 <213> Streptococcus pneumoniae
 <400> 102
 gactgtatca ggaacaacc gttcacacgc gatgaaccaa aaaaacgtg ccgtaaaacc 60
 aaaccttcaa aaagttactg ttcttatcga tgg 93
 <210> 103
 <211> 78
 <212> DNA
 <213> Streptococcus pneumoniae
 <400> 103
 ggacaaagaa accctcgaag aattgaaaga gttatcagaa tggcagaaac gaaaccaaga 60
 atatctaaaa aagaaggc 78
 <210> 104
 <211> 249
 <212> DNA
 <213> Streptococcus pneumoniae
 <400> 104
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 atgttcaggt cgatttttca gccaaagaag ccttgaata caaacttcca agcttacaac 180
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 tcaaaatct 249
 <210> 105
 <211> 312
 <212> DNA
 <213> Streptococcus pneumoniae
 <400> 105
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 atctcatgga cgaacaggga gactgtagct tactcaaagc ttttggtat caagacttta 180
 aaggagatt atcatgatg acagtccaaa aaaattaggc taccatgc cagcagagta 240

1028462_1.TXT

cgaaccccat catggtaccc tcatgatatg gccgactcga ccaggatcat ggccttttca 300
aggaaaggct gc 312

<210> 106
<211> 90
<212> DNA
<213> Streptococcus pneumoniae

<400> 106
gagagactac cagcttttcc tagaagtctt tcagggagga agttggacca aggcggaacc 60
aaagaaaaag gctcggatgg aagaagtcct 90

<210> 107
<211> 912
<212> DNA
<213> Streptococcus pneumoniae

<400> 107
agaaattgcc tctctacttg gaaaagctcc tcaactatc aactgaaat caagcgtggg 60
acagtcgcac aatgtcttgg aaaagggcgc ttcaaagagg ttattctgc cgactacgct 120
caacagtctt atgaaaacaa tcgcaagcgc tcggtcaaga aatcaagctt gaccaaggaa 180
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cacatctatt atgcgcaccc ctatgcctct tgggaaaggg gaactaatga gaatcacaac 720
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gaagacttct ggatggctaa cttgaacttg aaatttagca aaatggaaat aatttttatt 900
aaacgcttcc aa 912

<210> 108
<211> 108
<212> DNA
<213> Streptococcus pneumoniae

<400> 108
cctgtcatga ctatctcatc gcctactatg aaaaacatgg atttgtcaac gaagccaggt 60

1028462_1.TXT

cccagtcAAC ctttcaggg gaaacatggt atgatatggt ctgggaaa 108

<210> 109
 <211> 84
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 109
 acatcatcaa taaggatata cacaaggaaa tcatacgcaa actggactac gacgccccat 60
 cttgccctga gtgcggaaac caat 84

<210> 110
 <211> 81
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 110
 tacttccttc cacacaagta tgccagagaa agcttatcgc taccctctac caacaaaata 60
 ttacacagaa aacaagggtc g 81

<210> 111
 <211> 159
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 111
 gcagccttca aaaaagatca aattaatgag cgtgtcgaga aattaggtaa gttaaaacct 60
 attacaataa attacaacgg aaaatcagaa gtaattgata gtaaagaaaa attacaagag 120
 cttatgaata aagccgttaa agacgaagtg gctcaaata 159

<210> 112
 <211> 99
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 112
 gcttatgcgc attctaaaag aagcgtctga agtggcaggg caggaggcag acaatgtctt 60
 tgccaatgtc aaaataaatg taggagagat tttaagtat 99

<210> 113
 <211> 108
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 113
 caggccgac cttatcataa gcctcaccaa ccgcatcatc acgggtttcc ccaacaatct 60
 tataatctcc tgcctccgaa acataaacca actctgtgtg tccgcgcg 108

<210> 114
 <211> 390

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<212> DNA

<213> Streptococcus pneumoniae

<400> 114

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cctgactcac gtaagtcagc aaataataaa gcaaaccttg acttcataa tagtcgctgt      120
aaatcttccc tgtctgatga agcgcccaac ctgcataaaa atcctgcact tcttgtgcac      180
tcattaagtc gagtaatagc ggtactccta gagttatccc cgttacaagc gtactccata      240
gtaaaatfff caccaaagga agacgacttg attcacgatg atgcgattct tgttcgattt      300
gggtattctag aggttcacga ttctccttat gaacttcttc tactctacca tacacactca      360
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<210> 115

<211> 432

<212> DNA

<213> Streptococcus pneumoniae

<400> 115

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tttacggtaa gccatgtatt ctccttttat ttatctttta atccaagacc caaatcaatg      60
agtttgagtt tcacttcttc caaactcttg cgtccaagat ttctacttt catcatctct      120
gtctcagatt tttctgtcaa atcatgcaca gtattgatac cggcagcttt taaacagttg      180
tatgaacgca cagacaagtc cagttcctca atcgtacgat ctaaaatacg gtcgtcagat      240
tcagtatcag cttctttcat cacttcagtt gacttagcaa tctcagtaag atttgtaaac      300
aaatcaagat gttctgtcaa aatacgtgct gaaagcccta aagcatcttc tggaataatt      360
gttccatttg tcaagatttc aagggttaat ttgtcgaac catcattgct acctacacga      420
gcaggttcca ct      432

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<210> 116

<211> 54

<212> DNA

<213> Streptococcus pneumoniae

<400> 116

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cttgtctgca tgaagaataa gggctgctac aaggaaagaa acaactgctg ccac      54

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<210> 117

<211> 174

<212> DNA

<213> Streptococcus pneumoniae

<400> 117

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ttccattatt tgtcaaaata ctttttagtt tcagcaataa cgactggcga caagaccaag      60
agggcaatca agtttggcag agccatcaag gcgttaacga tatctgcgat aatccagacc      120
atatccaact cgataaatcc tctaacaag accatgagca caaaaaccac acgg      174

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<210> 118
<211> 141
<212> DNA
<213> Streptococcus pneumoniae

<400> 118
ggaaagaagg tattcataaa ataccctcta tcaagagtct cctcaaaaac aggaccgatg      60
attacaggca ggacaaaaga taagatagtc gataaaaagg ttggttgctc atttgaaaaa      120
agcacggtaa aatactcatc a                                          141

<210> 119
<211> 111
<212> DNA
<213> Streptococcus pneumoniae

<400> 119
tcttcaccag tttttcctaa acttgtaatg gtatctgggg caaataaacc aagagaaagg      60
cgcaatttcc cattttcgtc taaaatgtca ttccacttaa cttttgtctt g          111

<210> 120
<211> 231
<212> DNA
<213> Streptococcus pneumoniae

<400> 120
tacttaactt ctttctcagt tccgaagata gcttcttcaa aggtcaaatt gacacgatac      60
tgagatcatc ctcttggcg aggagcgttt ggattgcgcg aagaaccgcc tccgccgaag      120
aaacttgaga aaatatactc aaaaccaccg aagccacctg cccattgaa accgccgaaa      180
ccaccagctc caccaaaacc accattggcg cctgcagcac catactggtc a          231

<210> 121
<211> 267
<212> DNA
<213> Streptococcus pneumoniae

<400> 121
cagtcatggc gtcctattcc agattcaaaa tgctatacac aagaaaaact cactatcccc      60
attaaagaa gaaaagacat caaggacttc taccacaatt ccatccaag acacaaaaac      120
agccataaga gtcacctctc tgattcctat aggttgatta taacaagact ggctgaaatt      180
gtacatgaaa ataaaaatc aatagtactc atttgtatg tgactaatat tccgtctcgc      240
tccagaaggt acgaagtaaa tagagtt                                          267

<210> 122
<211> 180
<212> DNA
<213> Streptococcus pneumoniae

<400> 122

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ctgtttcgtt tttatcgtgt aattgttctt tatcgagggtt ggcataattta tcttttaatt 60
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 gcgcagccat tttttcacgg cgaacgatct gctgggtcatt tagttcttcc atatgttctg 180

<210> 123
 <211> 180
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 123
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 ttgaagtctt atcagccaaa agatgataga tttctgagaa agccttcaga tagtaggcatt 120
 cctgaatcag gtaatagcgg aaaatggcag gttctaataa cccctcttgt aattgtataa 180

<210> 124
 <211> 90
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 124
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 ggccgaataa cgacagattc gtcttctata 90

<210> 125
 <211> 249
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 125
 cctgggtctc cattttcaga gattttcggg gcaggatttt ttggtgtcgc gaaacgaata 60
 tttccacgtc caccacgacc accgtgggca acgataaatt ctgtcccatg ttcaatcaaa 120
 tctgttataa ctttgccagt ctccgcatca cgaacagtcg taccttgtgg tactcgaact 180
 ctaaggctct cagcaccacg accatgcac cctttgggtca tccctttttc accagaatca 240
 gccttgaaa 249

<210> 126
 <211> 333
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 126
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 aaggcatcac caagaatggt gtcacgattg cgaccactg atttttcttc ccttttacc 120
 aacttgataa actggtcaaa ctggcaatca cgcgcaaac cagctaaact ctcttcacgg 180
 acaatcatag cacggagttt tgataggtca ccttcaggct ttttaggata ttttttatat 240
 agatattctg aaatcaataa ctgtagaaca gcgtctccta aaaattccaa gcgttcattg 300

tgtgaaattt ttaagaggcg gtgctcattg gca 333

<210> 127
 <211> 147
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 127
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 aagaccttcc agtcaagaaa gaccaagaga tatggggcaa gccccgaacc aagatataga 120
 gaatcaagga agccaagatt gtcacaa 147

<210> 128
 <211> 174
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 128
 cagccattgg gacactcgaa agccgaagaa catgagacta tctgttcgca taccttcgat 60
 aaccatagca ccgaaaccat accaaatcaa gtaaaaggcc gtgatatgac ctgcgtcgag 120
 actcttccat ttccgtctaa aaatcagaat caaggcaaag ccaagcagat tcca 174

<210> 129
 <211> 375
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 129
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 agctggattt tatgccaaga aaaaacctta ttccacatg atttggcatc tctttatcct 180
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 tcaatctcaa ctttttctt tacacatatt gataaagtac tgggtcaagc gcacatcatc 300
 agtcaattct ggatgaaaag aacttaccaa catatttttt tcttgggctg caacaatttg 360
 attgttcact gttgc 375

<210> 130
 <211> 207
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 130
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 actcagtatt acatccacca gctattaaga aaatgatgc gcctgtatgg gcatcaacag 120
 ctccataaca atagcgaat tctcgatat atgtgactatg gacatgtgga cctactccta 180

ttggagacca acaagatccc agtttac

207

<210> 131
 <211> 120
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 131
 caagtcatac aaatagacat agcaactaca aataaaacgg aatctgtaaa gagccaaagt 60
 gagagagaaa agaaaagatt gacaagcagt aatatactaa aggttagagg gcgaccgata 120

<210> 132
 <211> 96
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 132
 gccctttaaga gttccaaggt cccatcactt gatccatcat cgacaaagac atactcgatt 60
 tctgtttcca aatctggaag taaagcttcc agagcc 96

<210> 133
 <211> 207
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 133
 gataaaactg acccactggc taggaaactt cctgacaaaa gtaagccgtc aacttccttt 60
 tgcaccaaact cactttctcc cgtaaactatg gcttcattga cttccgcaaa gccttccaaa 120
 accaaggcat cactaggaat ctgctctcct gcagacaaac gaatgacatc tcctagcact 180
 aattcttcag gattaagagc aacttcc 207

<210> 134
 <211> 114
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 134
 ttatgccgat tacaaacaca agcaaggcca cgagggctctg tgaccaatct aacgaagcaa 60
 aataaggat atagatacct aaattatctc cgccagacgc aattgtcagc aatg 114

<210> 135
 <211> 330
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 135
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 gagattcatc ttgccccat atccgatata gttgttcaca aaggcaaaga ggaaggcgat 120
 gatggaatg atgatggccg ccaattttac ctgtttttgg ctcatattgtg tgggtctgcc 180

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aacaatacca aagtaatttc cccatttgct	330

<210> 136
 <211> 363
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 136	
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gttgggttgcg atggtaacgg caccacgttg accagcattc atgatgattt gggcttctct	180
atagtgggtt ttggcattca agacttcgtg aggaacacca gctgcaacca atttcttaga	240
aatgtagtca ctagtgttcaa ccgctactgt accaaccaag acaggttgac ccttttggtg	300
acgagcctta acgtcttcga caaccgcttt aaacttagat tcgatacttg cataaagaag	360
gtc	363

<210> 137
 <211> 81
 <212> DNA
 <213> Streptococcus pneumoniae

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gataaagtca aggccttcctc t	81

<210> 138
 <211> 102
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 138	
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tcaaaatcag ccatatcacc aaaaagagga tccactgcca ta	102

<210> 139
 <211> 333
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 139	
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acaatattca tctgtgtcac acccatctca gcagccaagg caatttcttc tgccctcacga	120
cctgcaaatt cttctacatt caagtgtgta tgtgtatcaa aaatcatctc ttctaacctc	180
gttttctatc ttctattata ccaaaaaaga ggagggggcac ctaatttttc ggtttccctt	240

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cctctcttca atagagagct attctgctat cttttctatc cgatattgcc catctcctat 300
 tccacagtta gagacagaag agattggcta cat 333

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 <211> 330
 <212> DNA
 <213> Streptococcus pneumoniae

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 ttaggagcca ctggtctctt aggaactgta accatggcaa tggcttgac tccaatcgtt 120
 tctgcttctc tcacatcttc catagttttc gcattttcaa tctctttgag agctgcttgt 180
 ttttctgctt ccactcttgc taaaagtctc gctttttctt tatcagaaag cggtcgcctt 240
 ttgatttcac cctgcttgct cttggctgct ttttcaatgg catttttagc tgattctttt 300
 tcagtagcta attgcttaga agcttgatgat 330

<210> 141
 <211> 159
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 141
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 cccaaagcac cacgaatgaa ttggcgaagc aaggttttgt caaaccaacc tgtaaacatt 120
 tccactaacc ataccaagag tgacaggccg ataaagaaa 159

<210> 142
 <211> 144
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 142
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 aatacttttg gtgctggggc agaggctcgc aagggtatcaa tacctagaac ggcaccatcg 120
 agaccaacat attgttacca gttt 144

<210> 143
 <211> 222
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 143
 agaggcagac gtggattatg cgttgcacga atcaaggctc ctgactagt cattaaacct 60
 aagagaacaa tcgattccgc taccaaagat agatacagtc caccactctc agctacatcc 120
 ctctccgtcc ccaaaagtc tcatctctct ttcccagca agatggacaa aaatcctaaa 180

aggaaactta atagtaaggt aatcttcaac gcctcagtc ca

222

<210> 144

<211> 90

<212> DNA

<213> Streptococcus pneumoniae

<400> 144

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gatttcaacc aagcccaacg gctctctgga 90

<210> 145

<211> 122

<212> PRT

<213> Streptococcus pneumoniae

<400> 145

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20 25 30Phe Met Gly Gly Val Leu Ile Leu Ile Met Leu Leu Phe Ile Leu Pro
35 40 45Thr Phe Asn Leu Ala Gln Ser Tyr Gln Gln Leu Leu Gln Arg Arg Gln
50 55 60Gln Leu Ala Asp Leu Gln Thr Gln Tyr Gln Thr Leu Ser Asp Glu Lys
65 70 75 80Asp Lys Glu Thr Ala Phe Ala Thr Lys Leu Lys Asp Glu Asp Tyr Ala
85 90 95Ala Lys Tyr Thr Arg Ala Lys Tyr Tyr Tyr Ser Lys Ser Arg Glu Lys
100 105 110Val Tyr Thr Ile Pro Asp Leu Leu Gln Arg
115 120

<210> 146

<211> 877

<212> PRT

<213> Streptococcus pneumoniae

<400> 146

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Arg Ala Phe Phe Ala Leu Tyr Gln Gln Leu Asp Arg Phe Lys Asn Val
 20 25 30
 Ala Gly Leu His Thr Asn Ala Ile Tyr Gly Phe Gln Leu Met Leu Ser
 35 40 45
 His Leu Leu Glu Arg Val Glu Pro Ser His Ile Leu Val Ala Phe Asp
 50 55 60
 Ala Gly Lys Thr Thr Phe Arg Thr Glu Met Tyr Ala Asp Tyr Lys Gly
 65 70 75 80
 Gly Arg Ala Lys Thr Pro Asp Glu Phe Arg Glu Gln Phe Pro Phe Ile
 85 90 95
 Arg Glu Leu Leu Asp His Met Gly Ile Arg His Tyr Asp Leu Ala Gln
 100 105 110
 Tyr Glu Ala Asp Asp Ile Ile Gly Thr Leu Asp Lys Leu Ala Glu Gln
 115 120 125
 Asp Gly Phe Asp Ile Thr Ile Val Ser Gly Asp Lys Asp Leu Ile Gln
 130 135 140
 Leu Thr Asp Glu His Thr Val Val Glu Ile Ser Lys Lys Gly Val Ala
 145 150 155 160
 Glu Phe Glu Ala Phe Thr Pro Asp Tyr Leu Met Glu Glu Met Gly Leu
 165 170 175
 Thr Pro Ala Gln Phe Ile Asp Leu Lys Ala Leu Met Gly Asp Lys Ser
 180 185 190
 Asp Asn Ile Pro Gly Val Thr Lys Val Gly Glu Lys Thr Gly Ile Lys
 195 200 205
 Leu Leu Leu Glu His Gly Ser Leu Glu Gly Ile Tyr Glu Asn Ile Asp
 210 215 220
 Gly Met Lys Thr Ser Lys Met Lys Glu Asn Leu Ile Asn Asp Lys Glu
 225 230 235 240
 Gln Ala Phe Leu Ser Lys Thr Leu Ala Thr Ile Asp Thr Lys Ala Pro
 245 250 255
 Ile Ala Ile Gly Leu Glu Asp Leu Val Tyr Ser Gly Pro Asp Val Glu
 260 265 270

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Asn Leu Gly Lys Phe Tyr Asp Glu Met Gly Phe Lys Gln Leu Lys Gln
 275 280 285
 Ala Leu Asn Val Ser Ser Ala Asp Val Ser Glu Ser Leu Asp Phe Thr
 290 295 300
 Ile Val Asp Gln Ile Ser Gln Asp Met Leu Ser Glu Glu Ser Ile Phe
 305 310 315 320
 His Phe Glu Leu Phe Gly Glu Asn Tyr His Thr Asp Asn Leu Val Gly
 325 330 335
 Phe Val Trp Ser Cys Gly Asp Lys Leu Tyr Ala Thr Asp Lys Leu Glu
 340 345 350
 Leu Leu Gln Asp Pro Ile Phe Lys Asp Phe Leu Glu Lys Thr Ser Leu
 355 360 365
 Arg Val Tyr Asp Phe Lys Lys Val Lys Val Leu Leu Gln Arg Phe Gly
 370 375 380
 Val Asp Leu Gln Ala Pro Ala Phe Asp Ile Arg Leu Ala Lys Tyr Leu
 385 390 395 400
 Leu Ser Thr Val Glu Asp Asn Glu Ile Ala Thr Ile Ala Ser Leu Tyr
 405 410 415
 Gly Gln Thr Tyr Leu Val Asp Asp Glu Thr Phe Tyr Gly Lys Gly Val
 420 425 430
 Lys Lys Ala Ile Pro Glu Arg Glu Lys Phe Leu Glu His Leu Ala Cys
 435 440 445
 Lys Leu Ala Val Leu Val Glu Thr Glu Pro Ile Leu Leu Glu Lys Leu
 450 455 460
 Ser Glu Asn Gly Gln Leu Glu Leu Leu Tyr Asp Met Glu Gln Pro Leu
 465 470 475 480
 Ala Phe Val Leu Ala Lys Met Glu Ile Ala Gly Ile Met Val Lys Lys
 485 490 495
 Glu Thr Leu Leu Glu Met Gln Ala Glu Asn Glu Leu Val Ile Glu Lys
 500 505 510
 Leu Thr Gln Glu Ile Tyr Glu Leu Ala Gly Glu Glu Phe Asn Val Asn

515

520

525

Ser Pro Lys Gln Leu Gly Val Leu Leu Phe Glu Lys Leu Gly Leu Pro
 530 535 540

Leu Glu Tyr Thr Lys Lys Thr Lys Thr Gly Tyr Ser Thr Ala Val Asp
 545 550 555 560

Val Leu Glu Arg Leu Ala Pro Ile Ala Pro Ile Val Lys Lys Ile Leu
 565 570 575

Asp Tyr Arg Gln Ile Ala Lys Ile Gln Ser Thr Tyr Val Ile Gly Leu
 580 585 590

Gln Asp Trp Ile Leu Ala Asp Gly Lys Ile His Thr Arg Tyr Val Gln
 595 600 605

Asp Leu Thr Gln Thr Gly Arg Leu Ser Ser Val Asp Pro Asn Leu Gln
 610 615 620

Asn Ile Pro Ala Arg Leu Glu Gln Gly Arg Leu Ile Arg Lys Ala Phe
 625 630 635 640

Val Pro Glu Trp Glu Asp Ser Val Leu Leu Ser Ser Asp Tyr Ser Gln
 645 650 655

Ile Glu Leu Arg Val Leu Ala His Ile Ser Lys Asp Glu His Leu Ile
 660 665 670

Lys Ala Phe Gln Glu Gly Ala Asp Ile His Thr Ser Thr Ala Met Arg
 675 680 685

Val Phe Gly Ile Glu Arg Pro Asp Asp Val Thr Ala Asn Asp Arg Arg
 690 695 700

Asn Ala Lys Ala Val Asn Phe Gly Val Val Tyr Gly Ile Ser Asp Phe
 705 710 715 720

Gly Leu Ser Asn Asn Leu Gly Ile Ser Arg Lys Glu Ala Lys Ala Tyr
 725 730 735

Ile Asp Thr Tyr Phe Glu Arg Phe Pro Gly Ile Lys Asn Tyr Met Asp
 740 745 750

Glu Val Val Arg Glu Ala Arg Asp Lys Gly Tyr Val Glu Thr Leu Phe
 755 760 765

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Lys Arg Arg Arg Glu Leu Pro Asp Ile Asn Ser Arg Asn Phe Asn Ile
 770 775 780

Arg Gly Phe Ala Glu Arg Thr Ala Ile Asn Ser Pro Ile Gln Gly Ser
 785 790 795 800

Ala Ala Asp Ile Leu Lys Ile Ala Met Ile Gln Leu Asp Lys Ala Leu
 805 810 815

Val Ala Gly Gly Tyr Gln Thr Lys Met Leu Leu Gln Val His Asp Glu
 820 825 830

Ile Val Leu Glu Val Pro Lys Ser Glu Leu Val Glu Met Lys Lys Leu
 835 840 845

Val Lys Gln Thr Met Glu Glu Ala Ile Gln Leu Ser Val Pro Leu Ile
 850 855 860

Ala Asp Glu Asn Glu Gly Ala Thr Trp Tyr Glu Ala Lys
 865 870 875

<210> 147

<211> 211

<212> PRT

<213> Streptococcus pneumoniae

<400> 147

Met Gly Met Ala Ala Phe Lys Asn Pro Asn Asn Gln Tyr Lys Ala Ile
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Thr Ile Ala Gln Thr Leu Gly Asp Asp Ala Ser Ser Glu Glu Leu Ala
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Gly Arg Tyr Gly Ser Ala Val Gln Cys Thr Glu Val Thr Ala Ser Asn
 35 40 45

Leu Ser Thr Val Lys Thr Lys Ala Thr Val Val Glu Lys Pro Leu Lys
 50 55 60

Asp Phe Arg Ala Ser Thr Ser Asp Gln Ser Gly Trp Val Glu Ser Asn
 65 70 75 80

Gly Lys Trp Tyr Phe Tyr Glu Ser Gly Asp Val Lys Thr Gly Trp Val
 85 90 95

Lys Thr Asp Gly Lys Trp Tyr Tyr Leu Asn Asp Leu Gly Val Met Gln
 100 105 110

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Thr Gly Phe Val Lys Phe Ser Gly Ser Trp Tyr Tyr Leu Ser Asn Ser
 115 120 125

Gly Ala Met Phe Thr Gly Trp Gly Thr Asp Gly Ser Arg Trp Phe Tyr
 130 135 140

Phe Asp Gly Ser Gly Ala Met Lys Thr Gly Trp Tyr Lys Glu Asn Gly
 145 150 155 160

Thr Trp Tyr Tyr Leu Asp Glu Ala Gly Ile Met Lys Thr Gly Trp Phe
 165 170 175

Lys Val Gly Pro His Trp Tyr Tyr Ala Tyr Gly Ser Gly Ala Leu Ala
 180 185 190

Val Ser Thr Thr Thr Pro Asp Gly Tyr Arg Val Asn Gly Asn Gly Glu
 195 200 205

Trp Val Asn
 210

<210> 148

<211> 1856

<212> PRT

<213> Streptococcus pneumoniae

<400> 148

Met Ser Arg Lys Ser Ile Gly Glu Lys Arg His Ser Phe Ser Met Arg
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Lys Leu Ser Val Gly Leu Val Ser Val Thr Val Ser Ser Phe Phe Leu
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Met Ser Gln Gly Ile Gln Ser Val Ser Ala Asp Asn Met Glu Ser Pro
 35 40 45

Ile His Tyr Lys Tyr Met Thr Glu Gly Lys Leu Thr Asp Glu Glu Lys
 50 55 60

Ser Leu Leu Val Glu Ala Leu Pro Gln Leu Ala Glu Glu Ser Asp Asp
 65 70 75 80

Thr Tyr Tyr Leu Val Tyr Arg Ser Gln Gln Phe Leu Pro Asn Thr Gly
 85 90 95

Phe Asn Pro Thr Val Gly Thr Phe Leu Phe Thr Ala Gly Leu Ser Leu
 100 105 110

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Leu Val Leu Leu Val Ser Lys Arg Glu Asn Gly Lys Lys Arg Leu Val
 115 120 125
 His Phe Leu Leu Leu Thr Ser Met Gly Val Gln Leu Leu Pro Ala Ser
 130 135 140
 Ala Phe Gly Leu Thr Ser Gln Ile Leu Ser Ala Tyr Asn Ser Gln Leu
 145 150 155 160
 Ser Ile Gly Val Gly Glu His Leu Pro Glu Pro Leu Lys Ile Glu Gly
 165 170 175
 Tyr Gln Tyr Ile Gly Tyr Ile Lys Thr Lys Lys Gln Asp Asn Thr Glu
 180 185 190
 Leu Ser Arg Thr Val Asp Gly Lys Tyr Ser Ala Gln Arg Asp Ser Gln
 195 200 205
 Pro Asn Ser Thr Lys Thr Ser Asp Val Val His Ser Ala Asp Leu Glu
 210 215 220
 Trp Asn Gln Gly Gln Gly Lys Val Ser Leu Gln Gly Glu Ala Ser Gly
 225 230 235 240
 Asp Asp Gly Leu Ser Glu Lys Ser Ser Ile Ala Ala Asp Asn Leu Ser
 245 250 255
 Ser Asn Asp Ser Phe Ala Ser Gln Val Glu Gln Asn Pro Asp His Lys
 260 265 270
 Gly Glu Ser Val Val Arg Pro Thr Val Pro Glu Gln Gly Asn Pro Val
 275 280 285
 Ser Ala Thr Thr Val Gln Ser Ala Glu Glu Glu Val Leu Ala Thr Thr
 290 295 300
 Asn Asp Arg Pro Glu Tyr Lys Leu Pro Leu Glu Thr Lys Gly Thr Gln
 305 310 315 320
 Glu Pro Gly His Glu Gly Glu Ala Ala Val Arg Glu Asp Leu Pro Val
 325 330 335
 Tyr Thr Lys Pro Leu Glu Thr Lys Gly Thr Gln Gly Pro Gly His Glu
 340 345 350
 Gly Glu Ala Ala Val Arg Glu Glu Glu Pro Ala Tyr Thr Glu Pro Leu
 355 360 365

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Ala Thr Lys Gly Thr Gln Glu Pro Gly His Glu Gly Lys Ala Thr Val
 370 375 380
 Arg Glu Glu Thr Leu Glu Tyr Thr Glu Pro Val Ala Thr Lys Gly Thr
 385 390 395 400
 Gln Glu Pro Glu His Glu Gly Glu Ala Ala Val Glu Glu Glu Leu Pro
 405 410 415
 Ala Leu Glu Val Thr Thr Arg Asn Arg Thr Glu Ile Gln Asn Ile Pro
 420 425 430
 Tyr Thr Thr Glu Glu Ile Gln Asp Pro Thr Leu Leu Lys Asn Arg Arg
 435 440 445
 Lys Ile Glu Arg Gln Gly Gln Ala Gly Thr Arg Thr Ile Gln Tyr Glu
 450 455 460
 Asp Tyr Ile Val Asn Gly Asn Val Val Glu Thr Lys Glu Val Ser Arg
 465 470 475 480
 Thr Glu Val Ala Pro Val Asn Glu Val Val Lys Val Gly Thr Leu Val
 485 490 495
 Lys Val Lys Pro Thr Val Glu Ile Thr Asn Leu Thr Lys Val Glu Asn
 500 505 510
 Lys Lys Ser Ile Thr Val Ser Tyr Asn Leu Ile Asp Thr Thr Ser Ala
 515 520 525
 Tyr Val Ser Ala Lys Thr Gln Val Phe His Gly Asp Lys Leu Val Lys
 530 535 540
 Glu Val Asp Ile Glu Asn Pro Ala Lys Glu Gln Val Ile Ser Gly Leu
 545 550 555 560
 Asp Tyr Tyr Thr Pro Tyr Thr Val Lys Thr His Leu Thr Tyr Asn Leu
 565 570 575
 Gly Glu Asn Asn Glu Glu Asn Thr Glu Thr Ser Thr Gln Asp Phe Gln
 580 585 590
 Leu Glu Tyr Lys Lys Ile Glu Ile Lys Asp Ile Asp Ser Val Glu Leu
 595 600 605
 Tyr Gly Lys Glu Asn Asp Arg Tyr Arg Arg Tyr Leu Ser Leu Ser Glu
 610 615 620

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Ala Pro Thr Asp Thr Ala Lys Tyr Phe Val Lys Val Lys Ser Asp Arg
 625 630 635 640

Phe Lys Glu Met Tyr Leu Pro Val Lys Ser Ile Thr Glu Asn Thr Asp
 645 650 655

Gly Thr Tyr Lys Val Thr Val Ala Val Asp Gln Leu Val Glu Glu Gly
 660 665 670

Thr Asp Gly Tyr Lys Asp Asp Tyr Thr Phe Thr Val Ala Lys Ser Lys
 675 680 685

Ala Glu Gln Pro Gly Val Tyr Thr Ser Phe Lys Gln Leu Val Thr Ala
 690 695 700

Met Gln Ser Asn Leu Ser Gly Val Tyr Thr Leu Ala Ser Asp Met Thr
 705 710 715 720

Ala Asp Glu Val Ser Leu Gly Asp Lys Gln Thr Ser Tyr Leu Thr Gly
 725 730 735

Ala Phe Thr Gly Ser Leu Ile Gly Ser Asp Gly Thr Lys Ser Tyr Ala
 740 745 750

Ile Tyr Asp Leu Lys Lys Pro Leu Phe Asp Thr Leu Asn Gly Ala Thr
 755 760 765

Val Arg Asp Leu Asp Ile Lys Thr Val Ser Ala Asp Ser Lys Glu Asn
 770 775 780

Val Ala Ala Leu Ala Lys Ala Ala Asn Ser Ala Asn Ile Asn Asn Val
 785 790 795 800

Ala Val Glu Gly Lys Ile Ser Gly Ala Lys Ser Val Ala Gly Leu Val
 805 810 815

Ala Ser Ala Thr Asn Thr Val Ile Glu Asn Ser Ser Phe Thr Gly Lys
 820 825 830

Leu Ile Ala Asn His Gln Asp Ser Asn Lys Asn Asp Thr Gly Gly Ile
 835 840 845

Val Gly Asn Ile Thr Gly Asn Ser Ser Arg Val Asn Lys Val Arg Val
 850 855 860

Asp Ala Leu Ile Ser Thr Asn Ala Arg Asn Asn Asn Gln Thr Ala Gly

865 870 875 880
 Gly Ile Val Gly Arg Leu Glu Asn Gly Ala Leu Ile Ser Asn Ser Val
 885 890 895
 Ala Thr Gly Glu Ile Arg Asn Gly Gln Gly Tyr Ser Arg Val Gly Gly
 900 905 910
 Ile Val Gly Ser Thr Trp Gln Asn Gly Arg Val Asn Asn Val Val Ser
 915 920 925
 Asn Val Asp Val Gly Asp Gly Tyr Val Ile Thr Gly Asp Gln Tyr Ala
 930 935 940
 Ala Ala Asp Val Lys Asn Ala Ser Thr Ser Val Asp Asn Arg Lys Ala
 945 950 955 960
 Asp Arg Phe Ala Thr Lys Leu Ser Lys Asp Gln Ile Asp Ala Lys Val
 965 970 975
 Ala Asp Tyr Gly Ile Thr Val Thr Leu Asp Asp Thr Gly Gln Asp Leu
 980 985 990
 Lys Arg Asn Leu Arg Glu Val Asp Tyr Thr Arg Leu Asn Lys Ala Glu
 995 1000 1005
 Ala Glu Arg Lys Val Ala Tyr Ser Asn Ile Glu Lys Leu Met Pro
 1010 1015 1020
 Phe Tyr Asn Lys Asp Leu Val Val His Tyr Gly Asn Lys Val Ala
 1025 1030 1035
 Thr Thr Asp Lys Leu Tyr Thr Thr Glu Leu Leu Asp Val Val Pro
 1040 1045 1050
 Met Lys Asp Asp Glu Val Val Thr Asp Ile Asn Asn Lys Lys Asn
 1055 1060 1065
 Ser Ile Asn Lys Val Met Leu His Phe Lys Asp Asn Thr Val Glu
 1070 1075 1080
 Tyr Leu Asp Val Thr Phe Lys Glu Asn Phe Ile Asn Ser Gln Val
 1085 1090 1095
 Ile Glu Tyr Asn Val Thr Gly Lys Glu Tyr Ile Phe Thr Pro Glu
 1100 1105 1110

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Ala Phe Val Ser Asp Tyr Thr Ala Ile Thr Asn Asn Val Leu Ser
 1115 1120 1125
 Asp Leu Gln Asn Val Thr Leu Asn Ser Glu Ala Thr Lys Lys Val
 1130 1135 1140
 Leu Gly Ala Ala Asn Asp Ala Ala Leu Asp Asn Leu Tyr Leu Asp
 1145 1150 1155
 Arg Gln Phe Glu Glu Val Lys Ala Asn Ile Ala Glu His Leu Arg
 1160 1165 1170
 Lys Val Leu Ala Met Asp Lys Ser Ile Asn Thr Thr Gly Asp Gly
 1175 1180 1185
 Val Val Glu Tyr Val Ser Glu Lys Ile Lys Asn Asn Lys Glu Ala
 1190 1195 1200
 Phe Met Leu Gly Leu Thr Tyr Met Asn Arg Trp Tyr Asp Ile Asn
 1205 1210 1215
 Tyr Gly Lys Met Asn Thr Lys Asp Leu Ser Thr Tyr Lys Phe Asp
 1220 1225 1230
 Phe Asn Gly Asn Asn Glu Thr Ser Thr Leu Asp Thr Ile Val Ala
 1235 1240 1245
 Leu Gly Asn Ser Gly Leu Asp Asn Leu Arg Ala Ser Asn Thr Val
 1250 1255 1260
 Gly Leu Tyr Ala Asn Lys Leu Ala Ser Val Lys Gly Glu Asp Ser
 1265 1270 1275
 Val Phe Asp Phe Val Glu Ala Tyr Arg Lys Leu Phe Leu Pro Asn
 1280 1285 1290
 Lys Thr Asn Asn Glu Trp Phe Lys Glu Asn Thr Lys Ala Tyr Ile
 1295 1300 1305
 Val Glu Met Lys Ser Asp Ile Ala Glu Val Arg Glu Lys Gln Glu
 1310 1315 1320
 Ser Pro Thr Ala Asp Arg Lys Tyr Ser Leu Gly Val Tyr Asp Arg
 1325 1330 1335
 Ile Ser Ala Pro Ser Trp Gly His Lys Ser Met Leu Leu Pro Leu
 1340 1345 1350

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Leu Thr 1355 Leu Pro Glu Glu Ser 1360 Val Tyr Ile Ser Ser 1365 Asn Met Ser
 Thr Leu 1370 Ala Phe Gly Ser Tyr 1375 Glu Arg Tyr Arg Asp 1380 Ser Val Asp
 Gly Val 1385 Ile Leu Ser Gly Asp 1390 Ala Leu Arg Thr Tyr 1395 Val Arg Asn
 Arg Val 1400 Asp Ile Ala Ala Lys 1405 Arg His Arg Asp His 1410 Tyr Asp Ile
 Trp Tyr 1415 Asn Leu Leu Asp Ser 1420 Ala Ser Lys Glu Lys 1425 Leu Phe Arg
 Ser Val 1430 Ile Val Tyr Asp Gly 1435 Phe Asn Val Lys Asp 1440 Glu Thr Gly
 Arg Thr 1445 Tyr Trp Ala Arg Leu 1450 Thr Asp Lys Asn Ile 1455 Gly Ser Ile
 Lys Glu 1460 Phe Phe Gly Pro Val 1465 Gly Lys Trp Tyr Glu 1470 Tyr Asn Ser
 Ser Ala 1475 Gly Ala Tyr Ala Asn 1480 Gly Ser Leu Thr His 1485 Phe Val Leu
 Asp Arg 1490 Leu Leu Asp Ala Tyr 1495 Gly Thr Ser Val Tyr 1500 Thr His Glu
 Met Val 1505 His Asn Ser Asp Ser 1510 Ala Ile Tyr Phe Glu 1515 Gly Asn Gly
 Arg Arg 1520 Glu Gly Leu Gly Ala 1525 Glu Leu Tyr Ala Leu 1530 Gly Leu Leu
 Gln Ser 1535 Val Asp Ser Val Asn 1540 Ser His Ile Leu Ala 1545 Leu Asn Thr
 Leu Tyr 1550 Lys Ala Glu Lys Asp 1555 Asp Leu Asn Arg Leu 1560 His Thr Tyr
 Asn Pro 1565 Val Glu Arg Phe Asp 1570 Ser Asp Glu Ala Leu 1575 Gln Ser Tyr
 Met His 1580 Gly Ser Tyr Asp Val 1585 Met Tyr Thr Leu Asp 1590 Ala Met Glu

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Ala Lys 1595 Ala Ile Leu Ala Gln 1600 Asn Asn Asp Val Lys 1605 Lys Lys Trp
 Phe Arg 1610 Lys Ile Glu Asn Tyr 1615 Tyr Val Arg Asp Thr 1620 Arg His Asn
 Lys Asp 1625 Thr His Ala Gly Asn 1630 Lys Val Arg Pro Leu 1635 Thr Asp Glu
 Glu Val 1640 Ala Asn Leu Thr Ser 1645 Leu Asn Ser Leu Ile 1650 Asp Asn Asp
 Ile Ile 1655 Asn Arg Arg Ser Tyr 1660 Asp Asp Ser Arg Glu 1665 Tyr Lys Arg
 Asn Gly 1670 Tyr Tyr Thr Ile Ser 1675 Met Phe Ser Pro Val 1680 Tyr Ala Ala
 Leu Ser 1685 Asn Ser Lys Gly Ala 1690 Pro Gly Asp Ile Met 1695 Phe Arg Lys
 Ile Ala 1700 Tyr Glu Leu Leu Ala 1705 Glu Lys Gly Tyr His 1710 Lys Gly Phe
 Leu Pro 1715 Tyr Val Ser Asn Gln 1720 Tyr Gly Ala Glu Ala 1725 Phe Ala Ser
 Gly Ser 1730 Lys Thr Phe Ser Ser 1735 Trp His Gly Arg Asp 1740 Val Ala Leu
 Val Thr 1745 Asp Asp Leu Val Phe 1750 Lys Lys Val Phe Asn 1755 Gly Glu Tyr
 Ser Ser 1760 Trp Ala Asp Phe Lys 1765 Lys Ala Met Phe Lys 1770 Gln Arg Ile
 Asp Lys 1775 Gln Asp Asn Leu Lys 1780 Pro Ile Thr Ile Gln 1785 Tyr Glu Leu
 Gly Asn 1790 Pro Asn Ser Thr Lys 1795 Glu Val Thr Ile Thr 1800 Thr Ala Ala
 Gln Met 1805 Gln Gln Leu Ile Asn 1810 Glu Ala Ala Ala Lys 1815 Asp Ile Thr
 Asn Ile Asp Arg Ala Thr Ser His Thr Pro Ala Ser Trp Val His
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1820

1825

Leu Leu Lys Gln Lys Ile Tyr Asn Ala Tyr Leu Arg Thr Thr Asp
1835 1840 1845

Asp Phe Arg Asn Ser Ile Tyr Lys
1850 1855

<210> 149
<211> 857
<212> PRT
<213> Streptococcus pneumoniae

<400> 149

Met Lys Phe Asn Pro Asn Gln Arg Tyr Thr Arg Trp Ser Ile Arg Arg
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Leu Ser Val Gly Val Ala Ser Val Val Val Ala Ser Gly Phe Phe Val
20 25 30

Leu Val Gly Gln Pro Ser Ser Val Arg Ala Asp Gly Leu Asn Pro Thr
35 40 45

Pro Gly Gln Val Leu Pro Glu Glu Thr Ser Gly Thr Lys Glu Gly Asp
50 55 60

Leu Ser Glu Lys Pro Gly Asp Thr Val Leu Thr Gln Ala Lys Pro Glu
65 70 75 80

Gly Val Thr Gly Asn Thr Asn Ser Leu Pro Thr Pro Thr Glu Arg Thr
85 90 95

Glu Val Ser Glu Glu Thr Ser Pro Ser Ser Leu Asp Thr Leu Phe Glu
100 105 110

Lys Asp Glu Glu Ala Gln Lys Asn Pro Glu Leu Thr Asp Val Leu Lys
115 120 125

Glu Thr Val Asp Thr Ala Asp Val Asp Gly Thr Gln Ala Ser Pro Ala
130 135 140

Glu Thr Thr Pro Glu Gln Val Lys Gly Gly Val Lys Glu Asn Thr Lys
145 150 155 160

Asp Ser Ile Asp Val Pro Ala Ala Tyr Leu Glu Lys Ala Glu Gly Lys
165 170 175

Gly Pro Phe Thr Ala Gly Val Asn Gln Val Ile Pro Tyr Glu Leu Phe
Page 130

180 185 190
 Ala Gly Asp Gly Met Leu Thr Arg Leu Leu Leu Lys Ala Ser Asp Asn
 195 200 205
 Ala Pro Trp Ser Asp Asn Gly Thr Ala Lys Asn Pro Ala Leu Pro Pro
 210 215 220
 Leu Glu Gly Leu Thr Lys Gly Lys Tyr Phe Tyr Glu Val Asp Leu Asn
 225 230 235 240
 Gly Asn Thr Val Gly Lys Gln Gly Gln Ala Leu Ile Asp Gln Leu Arg
 245 250 255
 Ala Asn Gly Thr Gln Thr Tyr Lys Ala Thr Val Lys Val Tyr Gly Asn
 260 265 270
 Lys Asp Gly Lys Ala Asp Leu Thr Asn Leu Val Ala Thr Lys Asn Val
 275 280 285
 Asp Ile Asn Ile Asn Gly Leu Val Ala Lys Glu Thr Val Gln Lys Ala
 290 295 300
 Val Ala Asp Asn Val Lys Asp Ser Ile Asp Val Pro Ala Ala Tyr Leu
 305 310 315 320
 Glu Lys Ala Lys Gly Glu Gly Pro Phe Thr Ala Gly Val Asn His Val
 325 330 335
 Ile Pro Tyr Glu Leu Phe Ala Gly Asp Gly Met Leu Thr Arg Leu Leu
 340 345 350
 Leu Lys Ala Ser Asp Lys Ala Pro Trp Ser Asp Asn Gly Asp Ala Lys
 355 360 365
 Asn Pro Ala Leu Ser Pro Leu Gly Glu Asn Val Lys Thr Lys Gly Gln
 370 375 380
 Tyr Phe Tyr Gln Val Ala Leu Asp Gly Asn Val Ala Gly Lys Glu Lys
 385 390 395 400
 Gln Ala Leu Ile Asp Gln Phe Arg Ala Asn Gly Thr Gln Thr Tyr Ser
 405 410 415
 Ala Thr Val Asn Val Tyr Gly Asn Lys Asp Gly Lys Pro Asp Leu Asp
 420 425 430

1028462_1.TXT

Asn Ile Val Ala Thr Lys Lys Val Thr Ile Asn Ile Asn Gly Leu Ile
 435 440 445
 Ser Lys Glu Thr Val Gln Lys Ala Val Ala Asp Asn Val Lys Asp Ser
 450 455 460
 Ile Asp Val Pro Ala Ala Tyr Leu Glu Lys Ala Lys Gly Glu Gly Pro
 465 470 475 480
 Phe Thr Ala Gly Val Asn His Val Ile Pro Tyr Glu Leu Phe Ala Gly
 485 490 495
 Asp Gly Met Leu Thr Arg Leu Leu Leu Lys Ala Ser Asp Lys Ala Pro
 500 505 510
 Trp Ser Asp Asn Gly Asp Ala Lys Asn Pro Ala Leu Ser Pro Leu Gly
 515 520 525
 Glu Asn Val Lys Thr Lys Gly Gln Tyr Phe Tyr Gln Leu Ala Leu Asp
 530 535 540
 Gly Asn Val Ala Gly Lys Glu Lys Gln Ala Leu Ile Asp Gln Phe Arg
 545 550 555 560
 Ala Asn Gly Thr Gln Thr Tyr Ser Ala Thr Val Asn Val Tyr Gly Asn
 565 570 575
 Lys Asp Gly Lys Pro Asp Leu Asp Asn Ile Val Ala Thr Lys Lys Val
 580 585 590
 Thr Ile Asn Ile Asn Gly Leu Ile Ser Lys Glu Thr Val Gln Lys Ala
 595 600 605
 Val Ala Asp Asn Val Lys Asp Ser Ile Asp Val Pro Ala Ala Tyr Leu
 610 615 620
 Glu Lys Ala Lys Gly Glu Gly Pro Phe Thr Ala Gly Val Asn His Val
 625 630 635 640
 Ile Pro Tyr Glu Leu Phe Ala Gly Asp Gly Met Leu Thr Arg Leu Leu
 645 650 655
 Leu Lys Ala Ser Asp Lys Ala Pro Trp Ser Asp Asn Gly Asp Ala Lys
 660 665 670
 Asn Pro Ala Leu Ser Pro Leu Gly Glu Asn Val Lys Thr Lys Gly Gln
 675 680 685

1028462_1.TXT

Tyr Phe Tyr Gln Val Ala Leu Asp Gly Asn Val Ala Gly Lys Glu Lys
690 695 700

Gln Ala Leu Ile Asp Gln Phe Arg Ala Asn Gly Thr Gln Thr Tyr Ser
705 710 715 720

Ala Thr Val Asn Val Tyr Gly Asn Lys Asp Gly Lys Pro Asp Leu Asp
725 730 735

Asn Ile Val Ala Thr Lys Lys Val Thr Ile Lys Ile Asn Val Lys Glu
740 745 750

Thr Ser Asp Thr Ala Asn Gly Ser Leu Ser Pro Ser Asn Ser Gly Ser
755 760 765

Gly Val Thr Pro Met Asn His Asn His Ala Thr Gly Thr Thr Asp Ser
770 775 780

Met Pro Ala Asp Thr Met Thr Ser Ser Thr Asn Thr Met Ala Gly Glu
785 790 795 800

Asn Met Ala Ala Ser Ala Asn Lys Met Ser Asp Thr Met Met Ser Glu
805 810 815

Asp Lys Ala Met Leu Pro Asn Thr Gly Glu Thr Gln Thr Ser Met Ala
820 825 830

Ser Ile Gly Phe Leu Gly Leu Ala Leu Ala Gly Leu Leu Gly Gly Leu
835 840 845

Gly Leu Lys Asn Lys Lys Glu Glu Asn
850 855

<210> 150
<211> 195
<212> PRT
<213> Streptococcus pneumoniae

<400> 150

Met Lys Ser Ile Thr Lys Lys Ile Lys Ala Thr Leu Ala Gly Val Ala
1 5 10 15

Ala Leu Phe Ala Val Phe Ala Pro Ser Phe Val Ser Ala Gln Glu Ser
20 25 30

Ser Thr Tyr Thr Val Lys Glu Gly Asp Thr Leu Ser Glu Ile Ala Glu
35 40 45

1028462_1.TXT

Thr His Asn Thr Thr Val Glu Lys Leu Ala Glu Asn His Ile Asp
50 55 60

Asn Ile His Leu Ile Tyr Val Asp Gln Glu Leu Val Ile Asp Gly Pro
65 70 75 80

Val Ala Pro Val Ala Thr Pro Ala Pro Ala Thr Tyr Ala Ala Pro Ala
85 90 95

Ala Gln Asp Glu Thr Val Ser Ala Pro Val Ala Glu Thr Pro Val Val
100 105 110

Ser Glu Thr Val Val Ser Thr Val Ser Gly Ser Glu Ala Glu Ala Lys
115 120 125

Glu Trp Ile Ala Gln Lys Glu Ser Gly Gly Ser Tyr Thr Ala Thr Asn
130 135 140

Gly Arg Tyr Ile Gly Arg Tyr Gln Leu Thr Asp Ser Tyr Leu Asn Gly
145 150 155 160

Asp Tyr Ser Ala Glu Asn Gln Glu Arg Val Ala Asp Ala Tyr Val Ala
165 170 175

Gly Arg Tyr Gly Ser Trp Thr Ala Ala Lys Asn Phe Trp Leu Asn Asn
180 185 190

Gly Trp Tyr
195

<210> 151

<211> 744

<212> PRT

<213> Streptococcus pneumoniae

<400> 151

Met Asn Lys Lys Lys Met Ile Leu Thr Ser Leu Ala Ser Val Ala Ile
1 5 10 15

Leu Gly Ala Gly Phe Val Thr Ser Gln Pro Thr Phe Val Arg Ala Glu
20 25 30

Glu Ser Pro Gln Val Val Glu Lys Ser Ser Leu Glu Lys Lys Tyr Glu
35 40 45

Glu Ala Lys Ala Lys Ala Asp Thr Ala Lys Lys Asp Tyr Glu Thr Ala
50 55 60

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Lys Lys Lys Ala Glu Asp Ala Gln Lys Lys Tyr Glu Asp Asp Gln Lys
 65 70 75 80
 Arg Thr Glu Glu Lys Ala Arg Lys Glu Ala Glu Ala Ser Gln Lys Leu
 85 90 95
 Asn Asp Val Ala Leu Val Val Gln Asn Ala Tyr Lys Glu Tyr Arg Glu
 100 105 110
 Val Gln Asn Gln Arg Ser Lys Tyr Lys Ser Asp Ala Glu Tyr Gln Lys
 115 120 125
 Lys Leu Thr Glu Val Asp Ser Lys Ile Glu Lys Ala Arg Lys Glu Gln
 130 135 140
 Gln Asp Leu Gln Asn Lys Phe Asn Glu Val Arg Ala Val Val Val Pro
 145 150 155 160
 Glu Pro Asn Ala Leu Ala Glu Thr Lys Lys Lys Ala Glu Glu Ala Lys
 165 170 175
 Ala Glu Glu Lys Val Ala Lys Arg Lys Tyr Asp Tyr Ala Thr Leu Lys
 180 185 190
 Val Ala Leu Ala Lys Lys Glu Val Glu Ala Lys Glu Leu Glu Ile Glu
 195 200 205
 Lys Leu Gln Tyr Glu Ile Ser Thr Leu Glu Gln Glu Val Ala Thr Ala
 210 215 220
 Gln His Gln Val Asp Asn Leu Lys Lys Leu Leu Ala Gly Ala Asp Pro
 225 230 235 240
 Asp Asp Gly Thr Glu Val Ile Glu Ala Lys Leu Lys Lys Gly Glu Ala
 245 250 255
 Glu Leu Asn Ala Lys Gln Ala Glu Leu Ala Lys Lys Gln Thr Glu Leu
 260 265 270
 Glu Lys Leu Leu Asp Ser Leu Asp Pro Glu Gly Lys Thr Gln Asp Glu
 275 280 285
 Leu Asp Lys Glu Ala Glu Glu Ala Glu Leu Asp Lys Lys Ala Asp Glu
 290 295 300
 Leu Gln Asn Lys Val Ala Asp Leu Glu Lys Glu Ile Ser Asn Leu Glu
 305 310 315 320

1028462_1.TXT

Ile Leu Leu Gly Gly Ala Asp Pro Glu Asp Asp Thr Ala Ala Leu Gln
 325 330 335
 Asn Lys Leu Ala Ala Lys Lys Ala Glu Leu Ala Lys Lys Gln Thr Glu
 340 345 350
 Leu Glu Lys Leu Leu Asp Ser Leu Asp Pro Glu Gly Lys Thr Gln Asp
 355 360 365
 Glu Leu Asp Lys Glu Ala Glu Glu Ala Glu Leu Asp Lys Lys Ala Asp
 370 375 380
 Glu Leu Gln Asn Lys Val Ala Asp Leu Glu Lys Glu Ile Ser Asn Leu
 385 390 395 400
 Glu Ile Leu Leu Gly Gly Ala Asp Ser Glu Asp Asp Thr Ala Ala Leu
 405 410 415
 Gln Asn Lys Leu Ala Thr Lys Lys Ala Glu Leu Glu Lys Thr Gln Lys
 420 425 430
 Glu Leu Asp Ala Ala Leu Asn Glu Leu Gly Pro Asp Gly Asp Glu Glu
 435 440 445
 Glu Thr Pro Ala Pro Ala Pro Gln Pro Glu Gln Pro Ala Pro Ala Pro
 450 455 460
 Lys Pro Glu Gln Pro Ala Pro Ala Pro Lys Pro Glu Gln Pro Ala Pro
 465 470 475 480
 Ala Pro Lys Pro Glu Gln Pro Ala Pro Ala Pro Lys Pro Glu Gln Pro
 485 490 495
 Ala Pro Ala Pro Lys Pro Glu Gln Pro Ala Lys Pro Glu Lys Pro Ala
 500 505 510
 Glu Glu Pro Thr Gln Pro Glu Lys Pro Ala Thr Pro Lys Thr Gly Trp
 515 520 525
 Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp Gly Ser Met
 530 535 540
 Ala Ile Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala
 545 550 555 560
 Asn Gly Ala Met Ala Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr

Tyr Leu Glu Ala Ser Gly Ala Met Lys Ala Ser Gln Trp Phe Lys Val
580 585 590

Ser Asp Lys Trp Tyr Tyr Val Asn Ser Asn Gly Ala Met Ala Thr Gly
595 600 605

Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp
610 615 620

Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn
625 630 635 640

Ala Asn Gly Asp Met Ala Thr Gly Trp Ala Lys Val Asn Gly Ser Trp
645 650 655

Tyr Tyr Leu Asn Ala Asn Gly Ala Met Ala Thr Gly Trp Ala Lys Val
660 665 670

Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ser Met Ala Thr Gly
675 680 685

Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser Gly Ala
690 695 700

Met Lys Ala Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val
705 710 715 720

Asn Gly Leu Gly Ala Leu Ala Val Asn Thr Thr Val Asp Gly Tyr Lys
725 730 735

Val Asn Ala Asn Gly Glu Trp Val
740

<210> 152
<211> 189
<212> PRT
<213> Streptococcus pneumoniae

<400> 152

Met Lys Lys Ile Val Leu Val Ser Leu Ala Phe Leu Phe Val Leu Val
1 5 10 15

Gly Cys Gly Gln Lys Lys Glu Thr Gly Pro Ala Thr Lys Thr Glu Lys
20 25 30

Asp Thr Leu Gln Ser Ala Leu Pro Val Ile Glu Asn Ala Glu Lys Asn
Page 137

Thr Val Val Thr Lys Thr Leu Val Leu Pro Lys Ser Asp Asp Gly Ser
50 55 60

Gln Gln Thr Gln Thr Ile Thr Tyr Lys Asp Lys Thr Phe Leu Ser Leu
65 70 75 80

Ala Ile Gln Gln Lys Arg Pro Val Ser Asp Glu Leu Lys Thr Tyr Ile
85 90 95

Asp Gln His Gly Val Glu Glu Thr Gln Lys Ala Leu Leu Glu Ala Glu
100 105 110

Glu Lys Asp Lys Ser Ile Ile Glu Ala Arg Lys Leu Ala Gly Phe Lys
115 120 125

Leu Glu Thr Lys Leu Leu Ser Ala Thr Glu Leu Gln Thr Thr Thr Ser
130 135 140

Phe Asp Phe Gln Val Leu Asp Val Lys Lys Ala Ser Gln Leu Glu His
145 150 155 160

Leu Lys Asn Ile Gly Leu Glu Asn Leu Leu Lys Asn Glu Pro Ser Lys
165 170 175

Tyr Ile Ser Asp Arg Leu Ala Asn Gly Ala Thr Glu Gln
180 185

<210> 153
<211> 416
<212> PRT
<213> Streptococcus pneumoniae

<400> 153

Met Phe Glu Val Glu Glu Trp Leu His Ser Arg Ile Gly Leu Asn Phe
1 5 10 15

Arg Ser Gly Leu Gly Arg Met Gln Gln Ala Val Asp Leu Glu Gly Asn
20 25 30

Pro Glu Gln Ser Tyr Pro Ile Ile His Val Thr Gly Thr Asn Gly Lys
35 40 45

Gly Ser Thr Ile Ala Phe Met Arg Glu Leu Phe Met Gly His Gly Lys
50 55 60

Lys Val Ala Thr Phe Thr Ser Pro His Ile Val Ser Ile Asn Asp Arg
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65

70

80

Ile Cys Ile Asn Gly Gln Pro Ile Ala Asp Ala Asp Phe Ile Arg Leu
 85 90 95
 Thr Asp Gln Val Lys Glu Met Glu Lys Thr Leu Leu Gln Thr Pro Ala
 100 105 110
 Gln Leu Ser Phe Phe Glu Leu Leu Thr Leu Val Ala Phe Leu Tyr Phe
 115 120 125
 Arg Glu Gln Glu Val Asp Leu Val Leu Leu Glu Val Gly Ile Gly Gly
 130 135 140
 Leu Leu Asp Thr Thr Asn Val Val Thr Gly Glu Phe Ala Val Ile Thr
 145 150 155 160
 Ser Ile Gly Leu Asp His Gln Glu Thr Leu Gly Asp Ser Leu Glu Ala
 165 170 175
 Ile Ala Glu Gln Lys Ala Gly Ile Phe Lys Ala Gly Lys Lys Ala Val
 180 185 190
 Ile Ala Lys Leu Pro Pro Glu Ala Arg Leu Ala Cys Gln Lys Lys Ala
 195 200 205
 Glu Ser Leu Ala Val Asn Leu Tyr Gln Ala Gly Gln Asp Phe Leu Met
 210 215 220
 Leu Asn Gly Asp Phe Ser Ser Ser Leu Leu Asn Leu Ser Gln Leu Asn
 225 230 235 240
 Ile Gly Leu Glu Gly Val Tyr Gln Gln Glu Asn Ala Ala Leu Ala Leu
 245 250 255
 Gln Thr Phe Leu Leu Phe Met Arg Glu Arg Lys Glu Ala Val Asp Glu
 260 265 270
 Gln Ala Val Arg Lys Ala Leu Glu Gln Thr His Trp Ala Gly Arg Leu
 275 280 285
 Glu Arg Ile Arg Pro Gln Ile Tyr Leu Asp Gly Ala His Asn Leu Pro
 290 295 300
 Ala Leu Thr Arg Leu Ala Glu Phe Ile Lys Glu Lys Glu Gln Glu Gly
 305 310 315 320

1028462_1.TXT

Tyr Arg Pro Gln Ile Leu Phe Gly Ser Leu Lys Arg Lys Asp Tyr Gln
 325 330 335

Gly Met Leu Gly Tyr Leu Thr Glu Lys Leu Pro Gln Val Glu Leu Lys
 340 345 350

Val Thr Gly Phe Asp Tyr Gln Gly Ala Leu Asp Glu Arg Asp Val Thr
 355 360 365

Gly Tyr Asp Ile Val Ser Ser Tyr Arg Glu Phe Ile Ser Asp Phe Glu
 370 375 380

Glu Arg Ala Asp Ala Gln Asp Leu Leu Phe Val Thr Gly Ser Leu Tyr
 385 390 395 400

Phe Ile Ser Glu Val Arg Gly Tyr Leu Leu Asp Arg Glu Gln Ile Asn
 405 410 415

<210> 154

<211> 277

<212> PRT

<213> Streptococcus pneumoniae

<400> 154

Val Gly Ile Arg Val Tyr Lys Pro Thr Thr Asn Gly Arg Arg Asn Met
 1 5 10 15

Thr Ser Leu Asp Phe Ala Glu Ile Thr Thr Ser Thr Pro Glu Lys Ser
 20 25 30

Leu Leu Val Ala Leu Lys Ser Lys Ala Gly Arg Asn Asn Asn Gly Arg
 35 40 45

Ile Thr Val Arg His Gln Gly Gly Gly His Lys Arg Phe Tyr Arg Leu
 50 55 60

Val Asp Phe Lys Arg Asn Lys Asp Asn Val Glu Ala Val Val Lys Thr
 65 70 75 80

Ile Glu Tyr Asp Pro Asn Arg Ser Ala Asn Ile Ala Leu Val His Tyr
 85 90 95

Thr Asp Gly Val Lys Ala Tyr Ile Ile Ala Pro Lys Gly Leu Glu Val
 100 105 110

Gly Gln Arg Ile Val Ser Gly Pro Glu Ala Asp Ile Lys Val Gly Asn
 115 120 125

1028462_1.TXT

Ala Leu Pro Leu Ala Asn Ile Pro Val Gly Thr Leu Ile His Asn Ile
 130 135 140

Glu Leu Lys Pro Gly Arg Gly Gly Glu Leu Val Arg Ala Ala Gly Ala
 145 150 155 160

Ser Ala Gln Val Leu Gly Ser Glu Gly Lys Tyr Val Leu Val Arg Leu
 165 170 175

Gln Ser Gly Glu Val Arg Met Ile Leu Gly Thr Cys Arg Ala Thr Val
 180 185 190

Gly Val Val Gly Asn Glu Gln His Gly Leu Val Asn Leu Gly Lys Ala
 195 200 205

Gly Arg Ser Arg Trp Lys Gly Ile Arg Pro Thr Val Arg Gly Ser Val
 210 215 220

Met Asn Pro Asn Asp His Pro His Gly Gly Gly Glu Gly Lys Ala Pro
 225 230 235 240

Val Gly Arg Lys Ala Pro Ser Thr Pro Trp Gly Lys Pro Ala Leu Gly
 245 250 255

Leu Lys Thr Arg Asn Lys Lys Ala Lys Ser Asp Lys Leu Ile Val Arg
 260 265 270

Arg Arg Asn Glu Lys
 275

<210> 155

<211> 89

<212> PRT

<213> Streptococcus pneumoniae

<400> 155

Met Ala Lys Lys Ser Met Val Ala Arg Glu Ala Lys Arg Gln Lys Ile
 1 5 10 15

Val Asp Arg Tyr Ala Glu Lys Arg Ala Ala Leu Lys Ala Ala Gly Asp
 20 25 30

Tyr Glu Gly Leu Ser Lys Leu Pro Arg Asn Ala Ser Pro Thr Arg Leu
 35 40 45

His Asn Arg Cys Arg Val Thr Gly Arg Pro His Ser Val Tyr Arg Lys
 50 55 60

1028462_1.TXT

Phe Gly Leu Ser Arg Ile Ala Phe Arg Glu Leu Ala His Lys Gly Gln
 65 70 75 80

Ile Pro Gly Val Thr Lys Ala Ser Trp
 85

<210> 156
 <211> 445
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 156

Met Asp Ile Arg Gln Val Thr Glu Thr Ile Ala Met Ile Glu Gln
 1 5 10 15

Asn Phe Asp Ile Arg Thr Ile Thr Met Gly Ile Ser Leu Leu Asp Cys
 20 25 30

Ile Asp Pro Asp Ile Asn Arg Ala Ala Glu Lys Ile Tyr Gln Lys Ile
 35 40 45

Thr Thr Lys Ala Ala Asn Leu Val Ala Val Gly Asp Glu Ile Ala Ala
 50 55 60

Glu Leu Gly Ile Pro Ile Val Asn Lys Arg Val Ser Val Thr Pro Ile
 65 70 75 80

Ser Leu Ile Gly Ala Ala Thr Asp Ala Thr Asp Tyr Val Val Leu Ala
 85 90 95

Lys Ala Leu Asp Lys Ala Ala Lys Glu Ile Gly Val Asp Phe Ile Gly
 100 105 110

Gly Phe Ser Ala Leu Val Gln Lys Gly Tyr Gln Lys Gly Asp Glu Ile
 115 120 125

Leu Ile Asn Ser Ile Pro Arg Ala Leu Ala Glu Thr Asp Lys Val Cys
 130 135 140

Ser Ser Val Asn Ile Gly Ser Thr Lys Ser Gly Ile Asn Met Thr Ala
 145 150 155 160

Val Ala Asp Met Gly Arg Ile Ile Lys Glu Thr Ala Asn Leu Ser Asp
 165 170 175

Met Gly Val Ala Lys Leu Val Val Phe Ala Asn Ala Val Glu Asp Asn
 180 185 190

1028462_1.TXT

Pro Phe Met Ala Gly Ala Phe His Gly Val Gly Glu Ala Asp Val Ile
 195 200 205
 Ile Asn Val Gly Val Ser Gly Pro Gly Val Val Lys Arg Ala Leu Glu
 210 215 220
 Lys Val Arg Gly Gln Ser Phe Asp Val Val Ala Glu Thr Val Lys Lys
 225 230 235 240
 Thr Ala Phe Lys Ile Thr Arg Ile Gly Gln Leu Val Gly Gln Met Ala
 245 250 255
 Ser Glu Arg Leu Gly Val Glu Phe Gly Ile Val Asp Leu Ser Leu Ala
 260 265 270
 Pro Thr Pro Ala Val Gly Asp Ser Val Ala Arg Val Leu Glu Glu Met
 275 280 285
 Gly Leu Glu Thr Val Gly Thr His Gly Thr Thr Ala Ala Leu Ala Leu
 290 295 300
 Leu Asn Asp Gln Val Lys Lys Gly Gly Val Met Ala Cys Asn Gln Val
 305 310 315 320
 Gly Gly Leu Ser Gly Ala Phe Ile Pro Val Ser Glu Asp Glu Gly Met
 325 330 335
 Ile Ala Ala Val Gln Asn Gly Ser Leu Asn Leu Glu Lys Leu Glu Ala
 340 345 350
 Met Thr Ala Ile Cys Ser Val Gly Leu Asp Met Ile Ala Ile Pro Glu
 355 360 365
 Asp Thr Pro Ala Glu Thr Ile Ala Ala Met Ile Ala Asp Glu Ala Ala
 370 375 380
 Ile Gly Val Ile Asn Met Lys Thr Thr Ala Val Arg Ile Ile Pro Lys
 385 390 395 400
 Gly Lys Glu Gly Asp Met Ile Glu Phe Gly Gly Leu Leu Gly Thr Ala
 405 410 415
 Pro Val Met Lys Val Asn Gly Ala Ser Ser Val Asp Phe Ile Ser Arg
 420 425 430
 Gly Gly Gln Ile Pro Ala Pro Ile His Ser Phe Lys Asn
 435 440 445

1028462_1.TXT

<210> 157
 <211> 812
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 157

Met Val Asn Thr Glu Val Ala Arg Thr Thr Ile Lys Thr Glu Tyr Phe
 1 5 10 15

Gly Ser Leu Thr Glu Arg Met Asn Lys Tyr Arg Glu Asp Val Leu Asn
 20 25 30

Lys Lys Pro Tyr Ile Asp Ala Glu Arg Ala Val Leu Ala Thr Arg Ala
 35 40 45

Tyr Glu Arg Tyr Lys Glu Gln Pro Asn Val Leu Lys Arg Ala Tyr Met
 50 55 60

Leu Lys Glu Ile Leu Glu Asn Met Thr Ile Tyr Ile Glu Glu Glu Ser
 65 70 75 80

Met Ile Ala Gly Asn Gln Ala Ser Ser Asn Lys Asp Ala Pro Ile Phe
 85 90 95

Pro Glu Tyr Thr Leu Glu Phe Val Leu Asn Glu Leu Asp Leu Phe Glu
 100 105 110

Lys Arg Asp Gly Asp Val Phe Tyr Ile Thr Glu Glu Thr Lys Glu Gln
 115 120 125

Leu Arg Ser Ile Ala Pro Phe Trp Glu Asn Asn Asn Leu Arg Ala Arg
 130 135 140

Ala Gly Ala Leu Leu Pro Glu Glu Val Ser Val Tyr Met Glu Thr Gly
 145 150 155 160

Phe Phe Gly Met Glu Gly Lys Met Asn Ser Gly Asp Ala His Leu Ala
 165 170 175

Val Asn Tyr Gln Lys Leu Leu Gln Phe Gly Leu Arg Gly Phe Glu Glu
 180 185 190

Arg Ala Arg Lys Ala Lys Val Ala Leu Asp Leu Thr Asp Pro Ala Ser
 195 200 205

Ile Asp Lys Tyr His Phe Tyr Asp Ser Ile Phe Ile Val Ile Asp Ala
 210 215 220

1028462_1.TXT

Ile Lys Val Tyr Ala Lys Arg Phe Val Ala Leu Ala Lys Ser Leu Ala
 225 230 235 240
 Glu Asn Ala Asn Pro Lys Arg Lys Lys Glu Leu Leu Glu Ile Ala Asp
 245 250 255
 Ile Cys Ser Arg Val Pro Tyr Glu Pro Ala Thr Thr Phe Ala Glu Ala
 260 265 270
 Ile Gln Ser Val Trp Phe Ile Gln Cys Ile Leu Gln Ile Glu Ser Asn
 275 280 285
 Gly His Ser Leu Ser Tyr Gly Arg Phe Asp Gln Tyr Met Tyr Pro Tyr
 290 295 300
 Met Lys Ala Asp Leu Glu Ser Gly Lys Glu Thr Glu Asp Ser Ile Val
 305 310 315 320
 Glu Arg Leu Thr Asn Leu Trp Ile Lys Thr Ile Thr Ile Asn Lys Val
 325 330 335
 Arg Ser Gln Ser His Thr Phe Ser Ser Ala Gly Ser Pro Leu Tyr Gln
 340 345 350
 Asn Val Thr Ile Gly Gly Gln Thr Arg Asp Lys Lys Asp Ala Val Asn
 355 360 365
 Pro Leu Ser Tyr Leu Val Leu Lys Ser Val Ala Gln Thr His Leu Pro
 370 375 380
 Gln Pro Asn Leu Thr Val Arg Tyr His Ala Gly Leu Asp Ala Arg Phe
 385 390 395 400
 Met Asn Glu Cys Ile Glu Val Met Lys Leu Gly Phe Gly Met Pro Ala
 405 410 415
 Phe Asn Asn Asp Glu Ile Ile Ile Pro Ser Phe Ile Ala Lys Gly Val
 420 425 430
 Leu Glu Asp Asp Ala Tyr Asp Tyr Ser Ala Ile Gly Cys Val Glu Thr
 435 440 445
 Ala Val Pro Gly Lys Trp Gly Tyr Arg Cys Thr Gly Met Ser Tyr Met
 450 455 460
 Asn Phe Pro Lys Val Leu Leu Ile Thr Met Asn Asp Gly Ile Asp Pro
 465 470 475 480

1028462_1.TXT

Ala Ser Gly Lys Arg Phe Ala Pro Ser Phe Gly Arg Phe Lys Asp Met
 485 490 495
 Lys Asn Phe Ser Glu Leu Glu Asn Ala Trp Asp Lys Thr Leu Arg Tyr
 500 505 510
 Leu Thr Arg Met Ser Val Ile Val Glu Asn Ser Ile Asp Leu Ser Leu
 515 520 525
 Glu Arg Glu Val Pro Asp Ile Leu Cys Ser Ala Leu Thr Asp Asp Cys
 530 535 540
 Ile Gly Arg Gly Lys His Leu Lys Glu Gly Gly Ala Val Tyr Asp Tyr
 545 550 555 560
 Ile Ser Gly Leu Gln Val Gly Ile Ala Asn Leu Ser Asp Ser Leu Ala
 565 570 575
 Ala Ile Lys Lys Leu Val Phe Glu Glu Glu Arg Ile Ser Pro Ser Gln
 580 585 590
 Leu Trp His Ala Leu Glu Thr Asp Tyr Ala Gly Glu Glu Gly Lys Val
 595 600 605
 Ile Gln Glu Met Leu Ile His Asp Ala Pro Lys Tyr Gly Asn Asp Asp
 610 615 620
 Asp Tyr Ala Asp Lys Leu Val Thr Ala Ala Tyr Asp Ile Tyr Val Asp
 625 630 635
 Glu Ile Ala Lys Tyr Pro Asn Thr Arg Tyr Gly Arg Gly Pro Ile Gly
 645 650 655
 Gly Ile Arg Tyr Ser Gly Thr Ser Ser Ile Ser Ala Asn Val Gln Gln
 660 665 670
 Gly Arg Gly Thr Leu Ala Thr Pro Asp Gly Arg Asn Ala Gly Thr Pro
 675 680 685
 Leu Ala Glu Gly Cys Ser Pro Ser His Asn Met Asp Gln His Gly Pro
 690 695 700
 Thr Ser Val Leu Lys Ser Val Ser Lys Leu Pro Thr Asp Glu Ile Val
 705 710 715 720
 Gly Gly Val Leu Leu Asn Gln Lys Val Asn Pro Gln Thr Leu Ala Lys
 Page 146

Glu Glu Asp Lys Leu Lys Leu Ile Ala Leu Leu Arg Thr Phe Phe Asn
740 745 750

Arg Leu His Gly Tyr His Ile Gln Tyr Asn Val Val Ser Arg Glu Thr
755 760 765

Leu Ile Asp Ala Gln Lys His Pro Glu Lys His Arg Asp Leu Ile Val
770 775 780

Arg Val Ala Gly Tyr Ser Ala Phe Phe Asn Val Leu Ser Lys Ala Thr
785 790 795 800

Gln Asp Asp Ile Ile Gly Arg Thr Glu His Thr Leu
805 810

<210> 158

<211> 130

<212> PRT

<213> Streptococcus pneumoniae

<400> 158

Met Ser Gln Ala Gln Tyr Ala Gly Thr Gly Arg Arg Lys Asn Ala Val
1 5 10 15

Ala Arg Val Arg Leu Val Pro Gly Thr Gly Lys Ile Thr Val Asn Lys
20 25 30

Lys Asp Val Glu Glu Tyr Ile Pro His Ala Asp Leu Arg Leu Val Ile
35 40 45

Asn Gln Pro Phe Ala Val Thr Ser Thr Val Gly Ser Tyr Asp Val Phe
50 55 60

Val Asn Val Ile Gly Gly Tyr Ala Gly Gln Ser Gly Ala Ile Arg
65 70 75 80

His Gly Ile Ala Arg Ala Leu Leu Gln Val Asp Pro Asp Phe Arg Asp
85 90 95

Ser Leu Lys Arg Ala Gly Leu Leu Thr Arg Asp Ser Arg Lys Val Glu
100 105 110

Arg Lys Lys Pro Gly Leu Lys Lys Ala Arg Lys Ala Ser Gln Phe Ser
115 120 125

Lys Arg

130

<210> 159
 <211> 333
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 159

Leu Glu Lys Lys Leu Thr Ile Lys Asp Ile Ala Glu Met Ala Gln Thr
 1 5 10 15

Ser Lys Thr Thr Val Ser Phe Tyr Leu Asn Gly Lys Tyr Glu Lys Met
 20 25 30

Ser Gln Glu Thr Arg Glu Lys Ile Glu Lys Val Ile His Glu Thr Asn
 35 40 45

Tyr Lys Pro Ser Ile Val Ala Arg Ser Leu Asn Ser Lys Arg Thr Lys
 50 55 60

Leu Ile Gly Val Leu Ile Gly Asp Ile Thr Asn Ser Phe Ser Asn Gln
 65 70 75 80

Ile Val Lys Gly Ile Glu Asp Ile Ala Ser Gln Asn Gly Tyr Gln Val
 85 90 95

Met Ile Gly Asn Ser Asn Tyr Ser Gln Glu Ser Glu Asp Arg Tyr Ile
 100 105 110

Glu Ser Met Leu Leu Leu Gly Val Asp Gly Phe Ile Ile Gln Pro Thr
 115 120 125

Ser Asn Phe Arg Lys Tyr Ser Arg Ile Ile Asp Glu Lys Lys Lys Lys
 130 135 140

Met Val Phe Phe Asp Ser Gln Leu Tyr Glu His Arg Thr Ser Trp Val
 145 150 155 160

Lys Thr Asn Asn Tyr Asp Ala Val Tyr Asp Met Thr Gln Ser Cys Ile
 165 170 175

Glu Lys Gly Tyr Glu His Phe Leu Leu Ile Thr Ala Asp Thr Ser Arg
 180 185 190

Leu Ser Thr Arg Ile Glu Arg Ala Ser Gly Phe Val Asp Ala Leu Thr
 195 200 205

Asp Ala Asn Met Arg His Ala Ser Leu Thr Ile Glu Asp Lys His Thr
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220

210

215

Asn Leu Glu Gln Ile Lys Glu Phe Leu Gln Lys Glu Ile Asp Pro Asp
225 230 235 240

Glu Lys Thr Leu Val Phe Ile Pro Asn Cys Trp Ala Leu Pro Leu Val
245 250 255

Phe Thr Val Ile Lys Glu Leu Asn Tyr Asn Leu Pro Gln Val Gly Leu
260 265 270

Ile Gly Phe Asp Asn Thr Glu Trp Thr Cys Phe Ser Ser Pro Ser Val
275 280 285

Ser Thr Leu Val Gln Pro Ser Phe Glu Glu Gly Gln Gln Ala Thr Lys
290 295 300

Ile Leu Ile Asp Gln Ile Glu Gly Arg Asn Gln Glu Glu Arg Gln Gln
305 310 315 320

Val Leu Asp Cys Ser Val Asn Trp Lys Glu Ser Thr Phe
325 330

<210> 160
<211> 1767
<212> PRT
<213> Streptococcus pneumoniae

<400> 160

Met Asn Lys Gly Leu Phe Glu Lys Arg Cys Lys Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Leu Gly Val Ala Ser Val Met Ile Gly Ala Ala Phe Gly
20 25 30

Thr Ser Pro Val Leu Ala Asp Ser Val Gln Ser Gly Ser Thr Ala Asn
35 40 45

Leu Pro Ala Asp Leu Ala Thr Ala Leu Ala Thr Ala Lys Glu Asn Asp
50 55 60

Gly Arg Asp Phe Glu Ala Pro Lys Val Gly Glu Asp Gln Gly Ser Pro
65 70 75 80

Glu Val Thr Asp Gly Pro Lys Thr Glu Glu Glu Leu Leu Ala Leu Glu
85 90 95

Lys Glu Lys Pro Ala Glu Glu Lys Pro Lys Glu Asp Lys Pro Ala Ala

100 105 110
 Ala Lys Pro Glu Thr Pro Lys Thr Val Thr Pro Glu Trp Gln Thr Val
 115 120
 Ala Asn Lys Glu Gln Gln Gly Thr Val Thr Ile Arg Glu Glu Lys Gly
 130 135 140
 Val Arg Tyr Asn Gln Leu Ser Ser Thr Ala Gln Asn Asp Asn Ala Gly
 145 150 155 160
 Lys Pro Ala Leu Phe Glu Lys Lys Gly Leu Thr Val Asp Ala Asn Gly
 165 170 175
 Asn Ala Thr Val Asp Leu Thr Phe Lys Asp Asp Ser Glu Lys Gly Lys
 180 185 190
 Ser Arg Phe Gly Val Phe Leu Lys Phe Lys Asp Thr Lys Asn Asn Val
 195 200 205
 Phe Val Gly Tyr Asp Lys Asp Gly Trp Phe Trp Glu Tyr Lys Ser Pro
 210 215 220
 Thr Thr Ser Thr Trp Tyr Arg Gly Ser Arg Val Ala Ala Pro Glu Thr
 225 230 235 240
 Gly Ser Thr Asn Arg Leu Ser Ile Thr Leu Lys Ser Asp Gly Gln Leu
 245 250 255
 Asn Ala Ser Asn Asn Asp Val Asn Leu Phe Asp Thr Val Thr Leu Pro
 260 265 270
 Ala Ala Val Asn Asp His Leu Lys Asn Glu Lys Lys Ile Leu Leu Lys
 275 280 285
 Ala Gly Ser Tyr Asp Asp Glu Arg Thr Val Val Ser Val Lys Thr Asp
 290 295 300
 Asn Gln Glu Gly Val Lys Thr Glu Asp Thr Pro Ala Glu Lys Glu Thr
 305 310 315 320
 Gly Pro Glu Val Asp Asp Ser Lys Val Thr Tyr Asp Thr Ile Gln Ser
 325 330 335
 Lys Val Leu Lys Ala Val Ile Asp Gln Ala Phe Pro Arg Val Lys Glu
 340 345 350

1028462_1.TXT

Tyr Ser Leu Asn Gly His Thr Leu Pro Gly Gln Val Gln Gln Phe Asn
 355 360 365
 Gln Val Phe Ile Asn Asn His Arg Ile Thr Pro Glu Val Thr Tyr Lys
 370 375 380
 Lys Ile Asn Glu Thr Thr Ala Glu Tyr Leu Met Lys Leu Arg Asp Asp
 385 390 395 400
 Ala His Leu Ile Asn Ala Glu Met Thr Val Arg Leu Gln Val Val Asp
 405 410 415
 Asn Gln Leu His Phe Asp Val Thr Lys Ile Val Asn His Asn Gln Val
 420 425 430
 Thr Pro Gly Gln Lys Ile Asp Asp Glu Ser Lys Leu Leu Ser Ser Ile
 435 440 445
 Ser Phe Leu Gly Asn Ala Leu Val Ser Val Ser Ser Asn Gln Thr Gly
 450 455 460
 Ala Lys Phe Asp Gly Ala Thr Met Ser Asn Asn Thr His Val Ser Gly
 465 470 475 480
 Asp Asp His Ile Asp Val Thr Asn Pro Met Lys Asp Leu Ala Lys Gly
 485 490 495
 Tyr Met Tyr Gly Phe Val Ser Thr Asp Lys Leu Ala Ala Gly Val Trp
 500 505 510
 Ser Asn Ser Gln Asn Ser Tyr Gly Gly Gly Ser Asn Asp Trp Thr Arg
 515 520 525
 Leu Thr Ala Tyr Lys Glu Thr Val Gly Asn Ala Asn Tyr Val Gly Ile
 530 535 540
 His Ser Ser Glu Trp Gln Trp Glu Lys Ala Tyr Lys Gly Ile Val Phe
 545 550 555 560
 Pro Glu Tyr Thr Lys Glu Leu Pro Ser Ala Lys Val Val Ile Thr Glu
 565 570 575
 Asp Ala Asn Ala Asp Lys Asn Val Asp Trp Gln Asp Gly Ala Ile Ala
 580 585 590
 Tyr Arg Ser Ile Met Asn Asn Pro Gln Gly Trp Glu Lys Val Lys Asp
 595 600 605

1028462_1.TXT

Ile Thr Ala Tyr Arg Ile Ala Met Asn Phe Gly Ser Gln Ala Gln Asn
 610 615 620
 Pro Phe Leu Met Thr Leu Asp Gly Ile Lys Lys Ile Asn Leu His Thr
 625 630 635 640
 Asp Gly Leu Gly Gln Gly Val Leu Leu Lys Gly Tyr Gly Ser Glu Gly
 645 650 655
 His Asp Ser Gly His Leu Asn Tyr Ala Asp Ile Gly Lys Arg Ile Gly
 660 665 670
 Gly Val Glu Asp Phe Lys Thr Leu Ile Glu Lys Ala Lys Lys Tyr Gly
 675 680 685
 Ala His Leu Gly Ile His Val Asn Ala Ser Glu Thr Tyr Pro Glu Ser
 690 695 700
 Lys Tyr Phe Asn Glu Lys Ile Leu Arg Lys Asn Pro Asp Gly Ser Tyr
 705 710 715 720
 Ser Tyr Gly Trp Asn Trp Leu Asp Gln Gly Ile Asn Ile Asp Ala Ala
 725 730 735
 Tyr Asp Leu Ala His Gly Arg Leu Ala Arg Trp Glu Asp Leu Lys Lys
 740 745 750
 Lys Leu Gly Asp Gly Leu Asp Phe Ile Tyr Val Asp Val Trp Gly Asn
 755 760 765
 Gly Gln Ser Gly Asp Asn Gly Ala Trp Ala Thr His Val Leu Ala Lys
 770 775 780
 Glu Ile Asn Lys Gln Gly Trp Arg Phe Ala Ile Glu Trp Gly His Gly
 785 790 795 800
 Gly Glu Tyr Asp Ser Thr Phe His His Trp Ala Ala Asp Leu Thr Tyr
 805 810 815
 Gly Gly Tyr Thr Asn Lys Gly Ile Asn Ser Ala Ile Thr Arg Phe Ile
 820 825 830
 Arg Asn His Gln Lys Asp Ala Trp Val Gly Asp Tyr Arg Ser Tyr Gly
 835 840 845
 Gly Ala Ala Asn Tyr Pro Leu Leu Gly Gly Tyr Ser Met Lys Asp Phe
 850 855 860

1028462_1.TXT

Glu Gly Trp Gln Gly Arg Ser Asp Tyr Asn Gly Tyr Val Thr Asn Leu
865 870 875 880

Phe Ala His Asp Val Met Thr Lys Tyr Phe Gln His Phe Thr Val Ser
885 890 895

Lys Trp Glu Asn Gly Thr Pro Val Thr Met Thr Asp Asn Gly Ser Thr
900 905 910

Tyr Lys Trp Thr Pro Glu Met Arg Val Glu Leu Val Asp Ala Asp Asn
915 920 925

Asn Lys Val Val Val Thr Arg Lys Ser Asn Asp Val Asn Ser Pro Gln
930 935 940

Tyr Arg Glu Arg Thr Val Thr Leu Asn Gly Arg Val Ile Gln Asp Gly
945 950 955 960

Ser Ala Tyr Leu Thr Pro Trp Asn Trp Asp Ala Asn Gly Lys Lys Leu
965 970 975

Ser Thr Asp Lys Glu Lys Met Tyr Tyr Phe Asn Thr Gln Ala Gly Ala
980 985 990

Thr Thr Trp Thr Leu Pro Ser Asp Trp Ala Lys Ser Lys Val Tyr Leu
995 1000 1005

Tyr Lys Leu Thr Asp Gln Gly Lys Thr Glu Glu Gln Glu Leu Thr
1010 1015 1020

Val Lys Asp Gly Lys Ile Thr Leu Asp Leu Leu Ala Asn Gln Pro
1025 1030 1035

Tyr Val Leu Tyr Arg Ser Lys Gln Thr Asn Pro Glu Met Ser Trp
1040 1045 1050

Ser Glu Gly Met His Ile Tyr Asp Gln Gly Phe Asn Ser Gly Thr
1055 1060 1065

Leu Lys His Trp Thr Ile Ser Gly Asp Ala Ser Lys Ala Glu Ile
1070 1075 1080

Val Lys Ser Gln Gly Ala Asn Asp Met Leu Arg Ile Gln Gly Asn
1085 1090 1095

Lys Glu Lys Val Ser Leu Thr Gln Lys Leu Thr Gly Leu Lys Pro
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1100

1105

Asn Thr Lys Tyr Ala Val Tyr Val Gly Val Asp Asn Arg Ser Asn
1115 1120 1125

Ala Lys Ala Ser Ile Thr Val Asn Thr Gly Glu Lys Glu Val Thr
1130 1135 1140

Thr Tyr Thr Asn Lys Ser Leu Ala Leu Asn Tyr Val Lys Ala Tyr
1145 1150 1155

Ala His Asn Thr Arg Arg Asp Asn Ala Thr Val Asp Thr Ser
1160 1165 1170

Tyr Phe Gln Asn Met Tyr Ala Phe Phe Thr Thr Gly Ala Asp Val
1175 1180 1185

Ser Asn Val Thr Leu Thr Leu Ser Arg Glu Ala Gly Asp Gln Ala
1190 1195 1200

Thr Tyr Phe Asp Glu Ile Arg Thr Phe Glu Asn Asn Ser Ser Met
1205 1210 1215

Tyr Gly Asp Lys His Asp Thr Gly Lys Gly Thr Phe Lys Gln Asp
1220 1225 1230

Phe Glu Asn Val Ala Gln Gly Ile Phe Pro Phe Val Val Gly Gly
1235 1240 1245

Val Glu Gly Val Glu Asp Asn Arg Thr His Leu Ser Glu Lys His
1250 1255 1260

Asn Pro Tyr Thr Gln Arg Gly Trp Asn Gly Lys Lys Val Asp Asp
1265 1270 1275

Val Ile Glu Gly Asn Trp Ser Leu Lys Thr Asn Gly Leu Val Ser
1280 1285 1290

Arg Arg Asn Leu Val Tyr Gln Thr Ile Pro Gln Asn Phe Arg Phe
1295 1300 1305

Glu Ala Gly Lys Thr Tyr Arg Val Thr Phe Glu Tyr Glu Ala Gly
1310 1315 1320

Ser Asp Asn Thr Tyr Ala Phe Val Val Gly Lys Gly Glu Phe Gln
1325 1330 1335

1028462_1.TXT

Ser Gly Arg Arg Gly Thr Gln Ala Ser Asn Leu Glu Met His Glu
 1340 1345 1350
 Leu Pro Asn Thr Trp Thr Asp Ser Lys Lys Ala Lys Lys Ala Thr
 1355 1360 1365
 Phe Leu Val Thr Gly Ala Glu Thr Gly Asp Thr Trp Val Gly Ile
 1370 1375 1380
 Tyr Ser Thr Gly Asn Ala Ser Asn Thr Arg Gly Asp Ser Gly Gly
 1385 1390 1395
 Asn Ala Asn Phe Arg Gly Tyr Asn Asp Phe Met Met Asp Asn Leu
 1400 1405 1410
 Gln Ile Glu Glu Ile Thr Leu Thr Gly Lys Met Leu Thr Glu Asn
 1415 1420 1425
 Ala Leu Lys Asn Tyr Leu Pro Thr Val Ala Met Thr Asn Tyr Thr
 1430 1435 1440
 Lys Glu Ser Met Asp Ala Leu Lys Glu Ala Val Phe Asn Leu Ser
 1445 1450 1455
 Gln Ala Asp Asp Asp Ile Ser Val Glu Glu Ala Arg Ala Glu Ile
 1460 1465 1470
 Ala Lys Ile Glu Ala Leu Lys Asn Ala Leu Val Gln Lys Lys Thr
 1475 1480 1485
 Ala Leu Val Ala Asp Asp Phe Ala Ser Leu Thr Ala Pro Ala Gln
 1490 1495 1500
 Ala Gln Glu Gly Leu Ala Asn Ala Phe Asp Gly Asn Val Ser Ser
 1505 1510 1515
 Leu Trp His Thr Ser Trp Asn Gly Gly Asp Val Gly Lys Pro Ala
 1520 1525 1530
 Thr Met Val Leu Lys Glu Pro Thr Glu Ile Thr Gly Leu Arg Tyr
 1535 1540 1545
 Val Pro Arg Gly Ser Gly Ser Asn Gly Asn Leu Arg Asp Val Lys
 1550 1555 1560
 Leu Val Val Thr Asp Glu Ser Gly Lys Glu His Thr Phe Thr Ala
 1565 1570 1575

1028462_1.TXT

Thr Asp Trp Pro Asn Asn Lys Pro Lys Asp Ile Asp Phe Gly
 1580 1585 1590
 Lys Thr Ile Lys Ala Lys Lys Ile Val Leu Thr Gly Thr Lys Thr
 1595 1600 1605
 Tyr Gly Asp Gly Gly Asp Lys Tyr Gln Ser Ala Ala Glu Leu Ile
 1610 1615 1620
 Phe Thr Arg Pro Gln Val Ala Glu Thr Pro Leu Asp Leu Ser Gly
 1625 1630 1635
 Tyr Glu Ala Ala Leu Val Lys Ala Gln Lys Leu Thr Asp Lys Asp
 1640 1645 1650
 Asn Gln Glu Glu Val Ala Ser Val Gln Ala Ser Met Lys Tyr Ala
 1655 1660 1665
 Thr Asp Asn His Leu Leu Thr Glu Arg Met Val Glu Tyr Phe Ala
 1670 1675 1680
 Asp Tyr Leu Asn Gln Leu Lys Asp Ser Ala Thr Lys Pro Asp Ala
 1685 1690 1695
 Pro Thr Val Glu Lys Pro Glu Phe Lys Leu Arg Ser Leu Ala Ser
 1700 1705 1710
 Glu Gln Gly Lys Thr Pro Asp Tyr Lys Gln Glu Ile Ala Arg Pro
 1715 1720 1725
 Glu Thr Pro Glu Gln Ile Leu Pro Ala Thr Gly Glu Ser Gln Ser
 1730 1735 1740
 Asp Thr Ala Leu Ile Leu Ala Ser Val Ser Leu Ala Leu Ser Ala
 1745 1750 1755
 Leu Phe Val Val Lys Thr Lys Lys Asp
 1760 1765

<210> 161
 <211> 719
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 161

Met Asn Lys Pro Thr Ile Leu Arg Leu Ile Lys Tyr Leu Ser Ile Ser
 1 5 10 15

1028462_1.TXT

Phe Leu Ser Leu Val Ile Ala Ala Ile Val Leu Gly Gly Val Phe
 20 25 30
 Phe Tyr Tyr Val Ser Lys Ala Pro Ser Leu Ser Glu Ser Lys Leu Val
 35 40 45
 Ala Thr Thr Ser Ser Lys Ile Tyr Asp Asn Lys Asn Gln Leu Ile Ala
 50 55 60
 Asp Leu Gly Ser Glu Arg Arg Val Asn Ala Gln Ala Asn Asp Ile Pro
 65 70 75 80
 Thr Asp Leu Val Lys Ala Ile Val Ser Ile Glu Asp His Arg Phe Phe
 85 90 95
 Asp His Arg Gly Ile Asp Thr Ile Arg Ile Leu Gly Ala Phe Leu Arg
 100 105 110
 Asn Leu Gln Ser Asn Ser Leu Gln Gly Gly Ser Thr Leu Thr Gln Gln
 115 120 125
 Leu Ile Lys Leu Thr Tyr Phe Ser Thr Ser Thr Ser Asp Gln Thr Ile
 130 135 140
 Ser Arg Lys Ala Gln Glu Ala Trp Leu Ala Ile Gln Leu Glu Gln Lys
 145 150 155 160
 Ala Thr Lys Gln Glu Ile Leu Thr Tyr Tyr Ile Asn Lys Val Tyr Met
 165 170 175
 Ser Asn Gly Asn Tyr Gly Met Gln Thr Ala Ala Gln Asn Tyr Tyr Gly
 180 185 190
 Lys Asp Leu Asn Asn Leu Ser Leu Pro Gln Leu Ala Leu Leu Ala Gly
 195 200 205
 Met Pro Gln Ala Pro Asn Gln Tyr Asp Pro Tyr Ser His Pro Glu Ala
 210 215 220
 Ala Gln Asp Arg Arg Asn Leu Val Leu Ser Glu Met Lys Asn Gln Gly
 225 230 235 240
 Tyr Ile Ser Ala Glu Gln Tyr Glu Lys Ala Val Asn Thr Pro Ile Thr
 245 250 255
 Asp Gly Leu Gln Ser Leu Lys Ser Ala Ser Asn Tyr Pro Ala Tyr Met
 260 265 270

1028462_1.TXT

Asp Asn Tyr Leu Lys Glu Val Ile Asn Gln Val Glu Glu Glu Thr Gly
 275 280 285
 Tyr Asn Leu Leu Thr Thr Gly Met Asp Val Tyr Thr Asn Val Asp Gln
 290 295 300
 Glu Ala Gln Lys His Leu Trp Asp Ile Tyr Asn Thr Asp Glu Tyr Val
 305 310 315 320
 Ala Tyr Pro Asp Asp Glu Leu Gln Val Ala Ser Thr Ile Val Asp Val
 325 330 335
 Ser Asn Gly Lys Val Ile Ala Gln Leu Gly Ala Arg His Gln Ser Ser
 340 345 350
 Asn Val Ser Phe Gly Ile Asn Gln Ala Val Glu Thr Asn Arg Asp Trp
 355 360 365
 Gly Ser Thr Met Lys Pro Ile Thr Asp Tyr Ala Pro Ala Leu Glu Tyr
 370 375 380
 Gly Val Tyr Asp Ser Thr Ala Thr Ile Val His Asp Glu Pro Tyr Asn
 385 390 395 400
 Tyr Pro Gly Thr Asn Thr Pro Val Tyr Asn Trp Asp Arg Gly Tyr Phe
 405 410 415
 Gly Asn Ile Thr Leu Gln Tyr Ala Leu Gln Gln Ser Arg Asn Val Pro
 420 425 430
 Ala Val Glu Thr Leu Asn Lys Val Gly Leu Asn Arg Ala Lys Thr Phe
 435 440 445
 Leu Asn Gly Leu Gly Ile Asp Tyr Pro Ser Ile His Tyr Ser Asn Ala
 450 455 460
 Ile Ser Ser Asn Thr Thr Glu Ser Asp Lys Lys Tyr Gly Ala Ser Ser
 465 470 475 480
 Glu Lys Met Ala Ala Ala Tyr Ala Ala Phe Ala Asn Gly Gly Thr Tyr
 485 490 495
 Tyr Lys Pro Met Tyr Ile His Lys Val Val Phe Ser Asp Gly Ser Glu
 500 505 510
 Lys Glu Phe Ser Asn Val Gly Thr Arg Ala Met Lys Glu Thr Thr Ala
 Page 158

515

520

525

Tyr Met Met Thr Asp Met Met Lys Thr Val Leu Thr Tyr Gly Thr Gly
 530 535

Arg Asn Ala Tyr Leu Ala Trp Leu Pro Gln Ala Gly Lys Thr Gly Thr
 545 550 555 560

Ser Asn Tyr Thr Asp Glu Glu Ile Glu Asn His Ile Lys Thr Ser Gln
 565 570 575

Phe Val Ala Pro Asp Glu Leu Phe Ala Gly Tyr Thr Arg Lys Tyr Ser
 580 585 590

Met Ala Val Trp Thr Gly Tyr Ser Asn Arg Leu Thr Pro Leu Val Gly
 595 600 605

Asn Gly Leu Thr Val Ala Ala Lys Val Tyr Arg Ser Met Met Thr Tyr
 610 615 620

Leu Ser Glu Gly Ser Asn Pro Glu Asp Trp Asn Ile Pro Glu Gly Leu
 625 630 635 640

Tyr Arg Asn Gly Glu Phe Val Phe Lys Asn Gly Ala Arg Ser Thr Trp
 645 650 655

Asn Ser Pro Ala Pro Gln Gln Pro Pro Ser Thr Glu Ser Ser Ser
 660 665 670

Ser Ser Asp Ser Ser Thr Ser Gln Ser Ser Ser Thr Thr Pro Ser Thr
 675 680 685

Asn Asn Ser Thr Thr Thr Asn Pro Asn Asn Asn Thr Gln Gln Ser Asn
 690 695 700

Thr Thr Pro Asp Gln Gln Asn Gln Asn Pro Gln Pro Ala Gln Pro
 705 710 715

<210> 162

<211> 464

<212> PRT

<213> Streptococcus pneumoniae

<400> 162

Met Ser Lys Lys Arg Arg Asn Arg His Lys Lys Glu Gly Gln Glu Pro
 1 5 10 15

Gln Phe Asp Phe Asp Glu Ala Lys Glu Leu Thr Val Gly Gln Ala Ile
 Page 159

Arg Lys Asn Glu Glu Val Glu Ser Gly Val Leu Pro Glu Asp Ser Ile
 35 40 45
 Leu Asp Lys Tyr Val Lys Gln His Arg Asp Glu Ile Glu Ala Asp Lys
 50 55 60
 Phe Ala Thr Arg Gln Tyr Lys Lys Glu Glu Phe Val Glu Thr Gln Ser
 65 70 75 80
 Leu Asp Asp Leu Ile Gln Glu Met Arg Glu Ala Val Glu Lys Ser Glu
 85 90 95
 Ala Ser Ser Glu Glu Val Pro Ser Ser Glu Asp Ile Leu Leu Pro Leu
 100 105 110
 Pro Leu Asp Asp Glu Glu Gln Gly Leu Asp Pro Leu Leu Leu Asp Asp
 115 120 125
 Glu Asn Pro Thr Glu Met Thr Glu Glu Val Glu Glu Glu Gln Asn Leu
 130 135 140
 Ser Arg Leu Asp Gln Glu Asp Ser Glu Lys Lys Ser Lys Lys Gly Phe
 145 150 155 160
 Ile Leu Thr Val Leu Ala Leu Val Ser Val Ile Ile Cys Val Ser Ala
 165 170 175
 Tyr Tyr Val Tyr Arg Gln Val Ala Arg Ser Thr Lys Glu Ile Glu Thr
 180 185 190
 Ser Gln Ser Thr Thr Ala Asn Gln Ser Asp Val Asp Asp Phe Asn Thr
 195 200 205
 Leu Tyr Asp Ala Phe Tyr Thr Asp Ser Asn Lys Thr Ala Leu Lys Asn
 210 215 220
 Ser Gln Phe Asp Lys Leu Ser Gln Leu Lys Thr Leu Leu Asp Lys Leu
 225 230 235 240
 Glu Gly Ser Arg Glu His Thr Leu Ala Lys Ser Lys Tyr Asp Ser Leu
 245 250 255
 Ala Thr Gln Ile Lys Ala Ile Gln Asp Val Asn Ala Gln Phe Glu Lys
 260 265 270

1028462_1.TXT

Pro Ala Ile Val Asp Gly Val Leu Asp Thr Asn Ala Lys Ala Lys Ser
 275 280 285

Asp Ala Lys Phe Thr Asp Ile Lys Thr Gly Asn Thr Glu Leu Asp Lys
 290 295 300

Val Leu Asp Lys Ala Ile Ser Leu Gly Lys Ser Gln Gln Thr Ser Thr
 305 310 315 320

Ser Ser Ser Ser Ser Ser Gln Thr Ser Ser Ser Ser Ser Ser Gln Ala
 325 330 335

Ser Ser Asn Thr Thr Ser Glu Pro Lys Pro Ser Ser Ser Asn Glu Thr
 340 345 350

Arg Ser Ser Arg Ser Glu Val Asn Met Gly Leu Ser Ser Ala Gly Val
 355 360 365

Ala Val Gln Arg Ser Ala Ser Arg Val Ala Tyr Asn Gln Ser Ala Ile
 370 375 380

Asp Asp Ser Asn Asn Ser Ala Trp Asp Phe Ala Asp Gly Val Leu Glu
 385 390 395 400

Gln Ile Leu Ala Thr Ser Arg Ser Arg Gly Tyr Ile Thr Gly Asp Gln
 405 410 415

Tyr Ile Leu Glu Arg Val Asn Ile Val Asn Gly Asn Gly Tyr Tyr Asn
 420 425 430

Leu Tyr Lys Pro Asp Gly Thr Tyr Leu Phe Thr Leu Asn Cys Lys Thr
 435 440 445

Gly Tyr Phe Val Gly Asn Gly Ala Gly His Ala Asp Asp Leu Asp Tyr
 450 455 460

<210> 163

<211> 340

<212> PRT

<213> Streptococcus pneumoniae

<400> 163

Met Lys Leu Leu Lys Lys Met Met Gln Val Ala Leu Ala Val Phe Phe
 1 5 10 15

Phe Gly Leu Leu Ala Thr Asn Thr Val Phe Ala Asn Thr Thr Gly Gly
 20 25 30

1028462_1.TXT

Arg Phe Val Asp Lys Asp Asn Arg Lys Tyr Tyr Val Lys Asp Asp His
 35 40 45
 Lys Ala Ile Tyr Trp His Lys Ile Asp Gly Lys Thr Tyr Tyr Phe Gly
 50 55 60
 Asp Ile Gly Glu Met Val Val Gly Trp Gln Tyr Leu Glu Ile Pro Gly
 65 70 75 80
 Thr Gly Tyr Arg Asp Asn Leu Phe Asp Asn Gln Pro Val Asn Glu Ile
 85 90 95
 Gly Leu Gln Glu Lys Trp Tyr Tyr Phe Gly Gln Asp Gly Ala Leu Leu
 100 105 110
 Glu Gln Thr Asp Lys Gln Val Leu Glu Ala Lys Thr Ser Glu Asn Thr
 115 120 125
 Gly Lys Val Tyr Gly Glu Gln Tyr Pro Leu Ser Ala Glu Lys Arg Thr
 130 135 140
 Tyr Tyr Phe Asp Asn Asn Tyr Ala Val Lys Thr Gly Trp Ile Tyr Glu
 145 150 155 160
 Glu Gly His Trp Tyr Tyr Leu Asn Lys Leu Gly Asn Phe Gly Asp Asp
 165 170 175
 Ser Tyr Asn Pro Leu Pro Ile Gly Glu Val Ala Lys Gly Trp Thr Gln
 180 185 190
 Asp Phe His Val Thr Ile Asp Ile Asp Arg Ser Lys Pro Ala Pro Trp
 195 200 205
 Tyr Tyr Leu Asp Ala Ser Gly Lys Met Leu Thr Asp Trp Gln Lys Val
 210 215 220
 Asn Gly Lys Trp Tyr Tyr Phe Gly Ser Ser Gly Ser Met Ala Thr Gly
 225 230 235 240
 Trp Lys Tyr Val Arg Gly Lys Trp Tyr Tyr Leu Asp Asn Lys Asn Gly
 245 250 255
 Asp Met Lys Thr Gly Trp Gln Tyr Leu Gly Asn Lys Trp Tyr Tyr Leu
 260 265 270
 Arg Ser Ser Gly Ala Met Val Thr Gly Trp Tyr Gln Asp Gly Ser Thr
 275 280 285

1028462_1.TXT

Trp Tyr Tyr Leu Asp Pro Ser Asn Gly Asp Met Lys Ile Gly Trp Thr
 290 295 300

Lys Val Asn Gly Lys Trp Tyr Tyr Leu Asn Ser Asn Gly Ala Met Val
 305 310 315 320

Thr Gly Ser Gln Thr Ile Asp Gly Lys Val Tyr Asn Phe Ala Ser Ser
 325 330 335

Gly Glu Trp Ile
 340

<210> 164

<211> 332

<212> PRT

<213> Streptococcus pneumoniae

<400> 164

Met Lys Ile Leu Lys Lys Thr Met Gln Val Gly Leu Thr Val Phe Phe
 1 5 10 15

Phe Gly Leu Leu Gly Thr Ser Thr Val Phe Ala Asp Asp Ser Glu Gly
 20 25 30

Trp Gln Phe Val Gln Glu Asn Gly Arg Thr Tyr Tyr Lys Lys Gly Asp
 35 40 45

Leu Lys Glu Thr Tyr Trp Arg Val Ile Asp Gly Lys Tyr Tyr Tyr Phe
 50 55 60

Asp Ser Leu Ser Gly Glu Met Val Val Gly Trp Gln Tyr Ile Pro Phe
 65 70 75 80

Pro Ser Lys Gly Ser Thr Ile Gly Pro Tyr Pro Asn Gly Ile Arg Leu
 85 90 95

Glu Gly Phe Pro Lys Ser Glu Trp Tyr Tyr Phe Asp Lys Asn Gly Val
 100 105 110

Leu Gln Glu Phe Val Gly Trp Lys Thr Leu Glu Ile Lys Thr Lys Asp
 115 120 125

Ser Val Gly Arg Lys Tyr Gly Glu Lys Arg Glu Asp Ser Glu Asp Lys
 130 135 140

Glu Glu Lys Arg Tyr Tyr Thr Asn Tyr Tyr Phe Asn Gln Asn His Ser
 145 150 155 160

1028462_1.TXT

Leu Glu Thr Gly Trp Leu Tyr Asp Gln Ser Asn Trp Tyr Tyr Leu Ala
165 170 175

Lys Thr Glu Ile Asn Gly Glu Asn Tyr Leu Gly Gly Glu Arg Arg Ala
180 185 190

Gly Trp Ile Asn Asp Asp Ser Thr Trp Tyr Tyr Leu Asp Pro Thr Thr
195 200 205

Gly Ile Met Gln Thr Gly Trp Gln Tyr Leu Gly Asn Lys Trp Tyr Tyr
210 215 220

Leu Arg Ser Ser Gly Ala Met Ala Thr Gly Trp Tyr Gln Glu Gly Thr
225 230 235 240

Thr Trp Tyr Tyr Leu Asp His Pro Asn Gly Asp Met Lys Thr Gly Trp
245 250 255

Gln Asn Leu Gly Asn Lys Trp Tyr Tyr Leu Arg Ser Ser Gly Ala Met
260 265 270

Ala Thr Gly Trp Tyr Gln Asp Gly Ser Thr Trp Tyr Tyr Leu Asn Ala
275 280 285

Gly Asn Gly Asp Met Lys Thr Gly Trp Phe Gln Val Asn Gly Asn Trp
290 295 300

Tyr Tyr Ala Tyr Ser Ser Gly Ala Leu Ala Val Asn Thr Thr Val Asp
305 310 315 320

Gly Tyr Ser Val Asn Tyr Asn Gly Glu Trp Val Arg
325 330

<210> 165
<211> 285
<212> PRT
<213> Streptococcus pneumoniae

<400> 165

Met Val Leu Ser Lys Tyr Tyr Gly Val Ala Asp Gly Met Asn Val Glu
1 5 10 15

Gly Arg Gly Ser Ala Asn Phe Ile Lys Asp Asn Val Leu Ile Thr Ala
20 25 30

Ala His Asn Tyr Tyr Arg His Asp Tyr Gly Lys Glu Ala Asp Asp Ile
35 40 45

1028462_1.TXT

Tyr Val Leu Pro Ala Val Ser Pro Ser Gln Glu Pro Phe Gly Lys Ile
50 55 60

Lys Val Lys Glu Val Arg Tyr Leu Lys Glu Phe Arg Asn Leu Asn Ser
65 70 75 80

Lys Asp Ala Arg Glu Tyr Asp Leu Ala Leu Ile Leu Glu Glu Pro
85 90 95

Ile Gly Ala Lys Leu Gly Thr Leu Gly Leu Pro Thr Ser Gln Lys Asn
100 105 110

Leu Thr Gly Ile Thr Val Thr Ile Thr Gly Tyr Pro Ser Tyr Asn Phe
115 120 125

Lys Ile His Gln Met Tyr Thr Asp Lys Lys Gln Val Leu Ser Asp Asp
130 135 140

Gly Met Phe Leu Asp Tyr Gln Val Asp Thr Leu Glu Gly Ser Ser Gly
145 150 155 160

Ser Thr Val Tyr Asp Ala Ser His Arg Val Val Gly Val His Thr Leu
165 170 175

Gly Asp Gly Ala Asn Gln Ile Asn Ser Ala Val Lys Leu Asn Glu Arg
180 185 190

Asn Leu Pro Phe Ile Tyr Ser Val Leu Lys Gly Tyr Ser Leu Glu Gly
195 200 205

Trp Lys Lys Ile Asn Gly Ser Trp Tyr His Tyr Arg Gln His Asp Lys
210 215 220

Gln Thr Gly Trp Gln Glu Ile Asn Asp Thr Trp Tyr Tyr Leu Asp Ser
225 230 235 240

Ser Gly Lys Met Leu Thr Asp Trp Gln Lys Val Asn Gly Lys Trp Tyr
245 250 255

Tyr Leu Asn Ser Asn Gly Ala Met Val Thr Gly Ser Gln Thr Ile Asp
260 265 270

Gly Lys Val Tyr Asn Phe Ala Ser Ser Gly Glu Trp Ile
275 280 285

<210> 166
<211> 630

1028462_1.TXT

<212> PRT

<213> Streptococcus pneumoniae

<400> 166

Leu Met Lys Lys Thr Phe Phe Leu Leu Val Leu Gly Leu Phe Cys Leu
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Leu Pro Leu Ser Val Phe Ala Ile Asp Phe Lys Ile Asn Ser Tyr Gln
20 25 30

Gly Asp Leu Tyr Ile His Ala Asp Asn Thr Ala Glu Phe Arg Gln Lys
35 40 45

Ile Val Tyr Gln Phe Glu Glu Asp Phe Lys Gly Gln Ile Val Gly Leu
50 55 60

Gly Arg Ala Gly Lys Met Pro Ser Gly Phe Asp Ile Asp Pro His Pro
65 70 75 80

Lys Ile Gln Ala Ala Lys Asn Gly Ala Glu Leu Ala Asp Val Thr Ser
85 90 95

Glu Val Thr Glu Glu Ala Asp Gly Tyr Thr Val Arg Val Tyr Asn Pro
100 105 110

Gly Gln Glu Gly Asp Ile Val Glu Val Asp Leu Val Trp Asn Leu Lys
115 120 125

Asn Leu Leu Phe Leu Tyr Asp Asp Ile Ala Glu Leu Asn Trp Gln Pro
130 135 140

Leu Thr Asp Ser Ser Glu Ser Ile Glu Lys Phe Glu Phe His Val Arg
145 150 155 160

Gly Asp Lys Gly Ala Glu Lys Leu Phe Phe His Thr Gly Lys Leu Phe
165 170 175

Arg Glu Gly Thr Ile Glu Lys Ser Asn Leu Asp Tyr Thr Ile Arg Leu
180 185 190

Asp Asn Leu Pro Ala Lys Arg Gly Val Glu Leu His Ala Tyr Trp Pro
195 200 205

Arg Thr Asp Phe Ala Ser Ala Arg Asp Gln Gly Leu Lys Gly Asn Arg
210 215 220

Leu Glu Glu Phe Asn Lys Ile Glu Asp Ser Ile Val Arg Glu Lys Asp
225 230 235 240

1028462_1.TXT

Gln Ser Lys Gln Leu Val Thr Trp Val Leu Pro Ser Ile Leu Ser Ile
 245 250 255
 Ser Leu Leu Leu Ser Val Cys Phe Tyr Phe Ile Tyr Arg Arg Lys Thr
 260 265 270
 Thr Pro Ser Val Lys Tyr Ala Lys Asn His Arg Leu Tyr Glu Pro Pro
 275 280 285
 Met Glu Leu Glu Pro Met Val Leu Ser Glu Ala Val Tyr Ser Thr Ser
 290 295 300
 Leu Glu Glu Val Ser Pro Leu Val Lys Gly Ala Gly Lys Phe Thr Phe
 305 310 315 320
 Asp Gln Leu Ile Gln Ala Thr Leu Leu Asp Val Ile Asp Arg Gly Asn
 325 330 335
 Val Ser Ile Ile Ser Glu Gly Asp Ala Val Gly Leu Arg Leu Val Lys
 340 345 350
 Glu Asp Gly Leu Ser Ser Phe Glu Lys Asp Cys Leu Asn Leu Ala Phe
 355 360 365
 Ser Gly Lys Lys Glu Glu Thr Leu Ser Asn Leu Phe Ala Asp Tyr Lys
 370 375 380
 Val Ser Asp Ser Leu Tyr Arg Arg Ala Lys Val Ser Asp Glu Lys Arg
 385 390 395 400
 Ile Gln Ala Arg Gly Leu Gln Leu Lys Ser Ser Phe Glu Glu Val Leu
 405 410 415
 Asn Gln Met Gln Glu Gly Val Arg Lys Arg Val Ser Phe Trp Gly Leu
 420 425 430
 Pro Asp Tyr Tyr Arg Pro Leu Thr Gly Gly Glu Lys Ala Leu Gln Val
 435 440 445
 Gly Met Gly Ala Leu Thr Ile Leu Pro Leu Phe Ile Gly Phe Gly Leu
 450 455 460
 Phe Leu Tyr Ser Leu Asp Val His Gly Tyr Leu Tyr Leu Pro Leu Pro
 465 470 475 480
 Ile Leu Gly Phe Leu Gly Leu Val Leu Ser Val Phe Tyr Tyr Trp Lys

485

1028462_1.TXT
490

495

Leu Arg Leu Asp Asn Arg Asp Gly Val Leu Asn Glu Ala Gly Ala Glu
500 505 510

Val Tyr Tyr Leu Trp Thr Ser Phe Glu Asn Met Leu Arg Glu Ile Ala
515 520 525

Arg Leu Asp Gln Ala Glu Leu Glu Ser Ile Val Val Trp Asn Arg Leu
530 535 540

Leu Val Tyr Ala Thr Leu Phe Gly Tyr Ala Asp Lys Val Ser His Leu
545 550 555 560

Met Lys Val His Gln Ile Gln Val Glu Asn Pro Asp Ile Asn Leu Tyr
565 570 575

Val Ala Tyr Gly Trp His Ser Thr Phe Tyr His Ser Thr Ala Gln Met
580 585 590

Ser His Tyr Ala Ser Val Ala Asn Thr Ala Ser Thr Tyr Ser Val Ser
595 600 605

Ser Gly Ser Gly Ser Ser Gly Gly Gly Phe Ser Gly Gly Gly Gly Gly
610 615 620

Gly Ser Ile Gly Ala Phe
625 630

<210> 167
<211> 665
<212> PRT
<213> Streptococcus pneumoniae

<400> 167

Met Lys Ser Ile Asn Lys Phe Leu Thr Met Leu Ala Ala Leu Leu
1 5 10 15

Thr Ala Ser Ser Leu Phe Ser Ala Ala Thr Val Phe Ala Ala Gly Thr
20 25 30

Thr Thr Thr Ser Val Thr Val His Lys Leu Leu Ala Thr Asp Gly Asp
35 40 45

Met Asp Lys Ile Ala Asn Glu Leu Glu Thr Gly Asn Tyr Ala Gly Asn
50 55 60

Lys Val Gly Val Leu Pro Ala Asn Ala Lys Glu Ile Ala Gly Val Met
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65

70

75

80

Phe Val Trp Thr Asn Thr Asn Asn Glu Ile Ile Asp Glu Asn Gly Gln
 85 90 95
 Thr Leu Gly Val Asn Ile Asp Pro Gln Thr Phe Lys Leu Ser Gly Ala
 100 105 110
 Met Pro Ala Thr Ala Met Lys Lys Leu Thr Glu Ala Glu Gly Ala Lys
 115 120 125
 Phe Asn Thr Ala Asn Leu Pro Ala Ala Lys Tyr Lys Ile Tyr Glu Ile
 130 135 140
 His Ser Leu Ser Thr Tyr Val Gly Glu Asp Gly Ala Thr Leu Thr Gly
 145 150 155 160
 Ser Lys Ala Val Pro Ile Glu Ile Glu Leu Pro Leu Asn Asp Val Val
 165 170 175
 Asp Ala His Val Tyr Pro Lys Asn Thr Glu Ala Lys Pro Lys Ile Asp
 180 185 190
 Lys Asp Phe Lys Gly Lys Ala Asn Pro Asp Thr Pro Arg Val Asp Lys
 195 200 205
 Asp Thr Pro Val Asn His Gln Val Gly Asp Val Val Glu Tyr Glu Ile
 210 215 220
 Val Thr Lys Ile Pro Ala Leu Ala Asn Tyr Ala Thr Ala Asn Trp Ser
 225 230 235 240
 Asp Arg Met Thr Glu Gly Leu Ala Phe Asn Lys Gly Thr Val Lys Val
 245 250 255
 Thr Val Asp Asp Val Ala Leu Glu Ala Gly Asp Tyr Ala Leu Thr Glu
 260 265 270
 Val Ala Thr Gly Phe Asp Leu Lys Leu Thr Asp Ala Gly Leu Ala Lys
 275 280 285
 Val Asn Asp Gln Asn Ala Glu Lys Thr Val Lys Ile Thr Tyr Ser Ala
 290 295 300
 Thr Leu Asn Asp Lys Ala Ile Val Glu Val Pro Glu Ser Asn Asp Val
 305 310 315 320

1028462_1.TXT

Thr Phe Asn Tyr Gly Asn Asn Pro Asp His Gly Asn Thr Pro Lys Pro
 325 330 335
 Asn Lys Pro Asn Glu Asn Gly Asp Leu Thr Leu Thr Lys Thr Trp Val
 340 345 350
 Asp Ala Thr Gly Ala Pro Ile Pro Ala Gly Ala Glu Ala Thr Phe Asp
 355 360 365
 Leu Val Asn Ala Gln Thr Gly Lys Val Val Gln Thr Val Thr Leu Thr
 370 375 380
 Thr Asp Lys Asn Thr Val Thr Val Asn Gly Leu Asp Lys Asn Thr Glu
 385 390 395 400
 Tyr Lys Phe Val Glu Arg Ser Ile Lys Gly Tyr Ser Ala Asp Tyr Gln
 405 410 415
 Glu Ile Thr Thr Ala Gly Glu Ile Ala Val Lys Asn Trp Lys Asp Glu
 420 425 430
 Asn Pro Lys Pro Leu Asp Pro Thr Glu Pro Lys Val Val Thr Tyr Gly
 435 440 445
 Lys Lys Phe Val Lys Val Asn Asp Lys Asp Asn Arg Leu Ala Gly Ala
 450 455 460
 Glu Phe Val Ile Ala Asn Ala Asp Asn Ala Gly Gln Tyr Leu Ala Arg
 465 470 475 480
 Lys Ala Asp Lys Val Ser Gln Glu Glu Lys Gln Leu Val Val Thr Thr
 485 490 495
 Lys Asp Ala Leu Asp Arg Ala Val Ala Ala Tyr Asn Ala Leu Thr Ala
 500 505 510
 Gln Gln Gln Thr Gln Gln Glu Lys Glu Lys Val Asp Lys Ala Gln Ala
 515 520 525
 Ala Tyr Asn Ala Ala Val Ile Ala Ala Asn Asn Ala Phe Glu Trp Val
 530 535 540
 Ala Asp Lys Asp Asn Glu Asn Val Val Lys Leu Val Ser Asp Ala Gln
 545 550 555 560
 Gly Arg Phe Glu Ile Thr Gly Leu Leu Ala Gly Thr Tyr Tyr Leu Glu
 565 570 575

1028462_1.TXT

Glu Thr Lys Gln Pro Ala Gly Tyr Ala Leu Leu Thr Ser Arg Gln Lys
580 585 590

Phe Glu Val Thr Ala Thr Ser Tyr Ser Ala Thr Gly Gln Gly Ile Glu
595 600 605

Tyr Thr Ala Gly Ser Gly Lys Asp Asp Ala Thr Lys Val Val Asn Lys
610 615 620

Lys Ile Thr Ile Pro Gln Thr Gly Gly Ile Gly Thr Ile Ile Phe Ala
625 630 635 640

Val Ala Gly Ala Ala Ile Met Gly Ile Ala Val Tyr Ala Tyr Val Lys
645 650 655

Asn Asn Lys Asp Glu Asp Gln Leu Ala
660 665

<210> 168

<211> 279

<212> PRT

<213> Streptococcus pneumoniae

<400> 168

Met Ala Val Met Ala Tyr Pro Leu Val Ser Arg Leu Tyr Tyr Arg Val
1 5 10 15

Glu Ser Asn Gln Gln Ile Ala Asp Phe Asp Lys Glu Lys Ala Thr Leu
20 25 30

Asp Glu Ala Asp Ile Asp Glu Arg Met Lys Leu Ala Gln Ala Phe Asn
35 40 45

Asp Ser Leu Asn Asn Val Val Ser Gly Asp Pro Trp Ser Glu Glu Met
50 55 60

Lys Lys Lys Gly Arg Ala Glu Tyr Ala Arg Met Leu Glu Ile His Glu
65 70 75 80

Arg Met Gly His Val Glu Ile Pro Val Ile Asp Val Asp Leu Pro Val
85 90 95

Tyr Ala Gly Thr Ala Glu Glu Val Leu Gln Gln Gly Ala Gly His Leu
100 105 110

Glu Gly Thr Ser Leu Pro Ile Gly Gly Asn Ser Thr His Ala Val Ile
115 120 125

1028462_1.TXT

Thr Ala His Thr Gly Leu Pro Thr Thr Asp Leu Thr
130 135 140

Lys Leu Lys Val Gly Asp Lys Phe Tyr Val His Asn Ile Lys Glu Val
145 150 155 160

Met Ala Tyr Gln Val Asp Gln Val Lys Val Ile Glu Pro Thr Asn Phe
165 170 175

Asp Asp Leu Leu Ile Val Pro Gly His Asp Tyr Val Thr Leu Thr Thr
180 185 190

Cys Thr Pro Tyr Met Ile Asn Thr His Arg Leu Leu Val Arg Gly His
195 200 205

Arg Ile Pro Tyr Val Ala Glu Val Glu Glu Glu Phe Ile Ala Ala Asn
210 215 220

Lys Leu Ser His Leu Tyr Arg Tyr Leu Phe Tyr Val Ala Val Gly Leu
225 230 235 240

Ile Val Ile Leu Leu Trp Ile Ile Arg Arg Leu Arg Lys Lys Lys Lys
245 250 255

Gln Pro Glu Lys Ala Leu Lys Ala Leu Lys Ala Ala Arg Lys Glu Val
260 265 270

Lys Val Glu Asp Gly Gln Gln
275

<210> 169
<211> 283
<212> PRT
<213> Streptococcus pneumoniae

<400> 169

Met Ser Arg Thr Lys Leu Arg Ala Leu Leu Gly Tyr Leu Leu Met Leu
1 5 10 15

Val Ala Cys Leu Ile Pro Ile Tyr Cys Phe Gly Gln Met Val Leu Gln
20 25 30

Ser Leu Gly Gln Val Lys Gly His Ala Thr Phe Val Lys Ser Met Thr
35 40 45

Thr Glu Met Tyr Gln Glu Gln Gln Asn His Ser Leu Ala Tyr Asn Gln
50 55 60

1028462_1.TXT

Arg Leu Ala Ser Gln Asn Arg Ile Val Asp Pro Phe Leu Ala Glu Gly
 65 70 75 80
 Tyr Glu Val Asn Tyr Gln Val Ser Asp Asp Pro Asp Ala Val Tyr Gly
 85 90
 Tyr Leu Ser Ile Pro Ser Leu Glu Ile Met Glu Pro Val Tyr Leu Gly
 100 105
 Ala Asp Tyr His His Leu Gly Met Gly Leu Ala His Val Asp Gly Thr
 115 120 125
 Pro Leu Pro Leu Asp Gly Thr Gly Ile Arg Ser Val Ile Ala Gly His
 130 135 140
 Arg Ala Glu Pro Ser His Val Phe Phe Arg His Leu Asp Gln Leu Lys
 145 150 155 160
 Val Gly Asp Ala Leu Tyr Tyr Asp Asn Gly Gln Glu Ile Val Glu Tyr
 165 170 175
 Gln Met Met Asp Thr Glu Ile Ile Leu Pro Ser Glu Trp Glu Lys Leu
 180 185 190
 Glu Ser Val Ser Ser Lys Asn Ile Met Thr Leu Ile Thr Cys Asp Pro
 195 200 205
 Ile Pro Thr Phe Asn Lys Arg Leu Leu Val Asn Phe Glu Arg Val Ala
 210 215 220
 Val Tyr Gln Lys Ser Asp Pro Gln Thr Ala Ala Val Ala Arg Val Ala
 225 230 235 240
 Phe Thr Lys Glu Gly Gln Ser Val Ser Arg Val Ala Thr Ser Gln Trp
 245 250 255
 Leu Tyr Arg Gly Leu Val Val Leu Ala Phe Leu Gly Ile Leu Phe Val
 260 265 270
 Leu Trp Lys Leu Ala Arg Leu Leu Arg Gly Lys
 275 280

<210> 170
 <211> 1659
 <212> PRT
 <213> Streptococcus pneumoniae
 <400> 170

1028462_1.TXT

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 20 25 30
 Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala
 35 40 45
 Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala
 50 55 60
 Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys
 65 70 75 80
 Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn
 85 90 95
 Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro
 100 105 110
 Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala
 115 120 125
 Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn
 130 135 140
 Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys
 145 150 155 160
 Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro
 165 170 175
 Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro
 180 185 190
 Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala
 195 200 205
 Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala
 210 215 220
 Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala
 225 230 235 240
 Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln
 245 250 255

1028462_1.TXT

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp
 260 265 270
 Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu
 275 280 285
 Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu
 290 295 300
 Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu
 305 310 315 320
 Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln
 325 330 335
 Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln
 340 345 350
 Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile
 355 360 365
 Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His
 370 375 380
 Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly
 385 390 395 400
 Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys
 405 410 415
 Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn
 420 425 430
 Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr
 435 440 445
 Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu
 450 455 460
 Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly
 465 470 475 480
 Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly
 485 490 495
 Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr

500

505

510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr
 515 520
 Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp
 530 535 540
 Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly
 545 550 555 560
 Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu
 565 570 575
 Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu
 580 585 590
 Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu
 595 600 605
 Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala
 610 615 620
 His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr
 625 630 635 640
 Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu
 645 650 655
 Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly
 660 665 670
 Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val
 675 680 685
 Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His
 690 695 700
 Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu
 705 710 715 720
 Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys
 725 730 735
 Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys
 740 745 750

1028462_1.TXT

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser
 755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala
 770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp
 785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu
 805 810 815

Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe Pro Lys Thr
 820 825 830

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser
 835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile
 850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala
 865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp
 885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys
 900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys
 915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn
 930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu
 945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala
 965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro
 980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro
 995 1000 1005

1028462_1.TXT

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala
 1010 1015 1020
 Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr
 1025 1030 1035
 Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val
 1040 1045 1050
 Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly
 1055 1060 1065
 Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg
 1070 1075 1080
 Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu
 1085 1090 1095
 Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp
 1100 1105 1110
 Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly
 1115 1120 1125
 Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly Gln Asp
 1130 1135 1140
 Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser Gln Glu
 1145 1150 1155
 Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu Ser Glu
 1160 1165 1170
 Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu Glu His
 1175 1180 1185
 Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr Asp Ala Gln
 1190 1195 1200
 Lys Thr Gly Arg Gln Thr Leu Thr Leu His Tyr Gln Gly His Glu
 1205 1210 1215
 Val Ser Phe Asp Val Leu Val Ser Pro Lys Ala Ala Leu Asn Asp
 1220 1225 1230
 Glu Tyr Leu Lys Gln Lys Leu Ala Glu Val Glu Ala Ala Lys Asn
 1235 1240 1245

1028462_1.TXT

Lys Val Val Tyr Asn Phe Ala Ser Ser Glu Val Lys Glu Ala Phe
 1250 1255 1260
 Leu Lys Ala Ile Glu Ala Ala Glu Gln Val Leu Lys Asp His Glu
 1265 1270 1275
 Thr Ser Thr Gln Asp Gln Val Asn Asp Arg Leu Asn Lys Leu Thr
 1280 1285 1290
 Glu Ala His Lys Ala Leu Asn Gly Gln Glu Lys Phe Thr Glu Glu
 1295 1300 1305
 Lys Thr Glu Leu Asp Arg Leu Thr Gly Glu Val Gln Glu Leu Leu
 1310 1315 1320
 Ala Ala Lys Pro Asn His Pro Ser Gly Ser Ala Leu Ala Pro Leu
 1325 1330 1335
 Leu Glu Lys Asn Lys Ala Leu Val Glu Lys Val Asp Leu Ser Pro
 1340 1345 1350
 Glu Glu Leu Thr Thr Ala Lys Gln Ser Leu Lys Asp Leu Val Ala
 1355 1360 1365
 Leu Leu Lys Glu Asp Lys Pro Ala Val Phe Ser Asp Ser Lys Thr
 1370 1375 1380
 Gly Val Glu Val His Phe Ser Asn Lys Glu Lys Thr Val Ile Lys
 1385 1390 1395
 Gly Leu Lys Val Glu Arg Val Gln Ala Ser Ala Glu Glu Lys Lys
 1400 1405 1410
 Tyr Phe Ala Gly Glu Asp Ala His Val Phe Glu Ile Glu Gly Leu
 1415 1420 1425
 Asp Glu Lys Gly Gln Asp Val Asp Leu Ser Tyr Ala Ser Ile Val
 1430 1435 1440
 Lys Ile Pro Ile Glu Lys Asp Lys Lys Val Lys Lys Val Phe Phe
 1445 1450 1455
 Leu Pro Glu Gly Lys Glu Ala Val Glu Leu Ala Phe Glu Gln Thr
 1460 1465 1470
 Asp Ser His Val Ile Phe Thr Ala Pro His Phe Thr His Tyr Ala
 Page 179

1475

1480

Phe Val Tyr Glu Ser Ala Glu Lys Pro Gln Pro Ala Lys Pro Ala
1490 1495 1500

Pro Gln Asn Thr Val Leu Pro Lys Pro Thr Tyr Gln Pro Thr Ser
1505 1510 1515

Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu Lys Val
1520 1525 1530

Ala Phe His Arg Gln Glu His Glu Asn Thr Glu Met Leu Val Gly
1535 1540 1545

Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His
1550 1555 1560

Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr
1565 1570 1575

Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg
1640 1645 1650

Lys Arg Glu Asp Lys Asp
1655

<210> 171
<211> 487
<212> PRT
<213> Streptococcus pneumoniae

<400> 171

Met Ser Ile Thr Ser Phe Val Lys Arg Ile Gln Asp Ile Thr Arg Asn
1 5 10 15

Asp Ala Gly Val Asn Gly Asp Ala Gln Arg Ile Glu Gln Met Ser Trp
Page 180

20

25

30

Leu Leu Phe Leu Lys Ile Tyr Asp Ser Arg Glu Met Val Trp Glu Leu
 35 40 45
 Glu Glu Asp Glu Tyr Glu Ser Ile Ile Pro Glu Glu Leu Lys Trp Arg
 50 55 60
 Asn Trp Ala His Ala Gln Asn Gly Glu Arg Val Leu Thr Gly Asp Glu
 65 70 75 80
 Leu Leu Asp Phe Val Asn Asn Lys Leu Phe Lys Glu Leu Lys Glu Leu
 85 90 95
 Glu Ile Thr Ser Asn Met Pro Ile Arg Lys Thr Ile Val Lys Ser Ala
 100 105 110
 Phe Glu Asp Ala Asn Asn Tyr Met Lys Asn Gly Val Leu Leu Arg Gln
 115 120 125
 Val Ile Asn Val Ile Asp Glu Val Asp Phe Asn Ser Pro Glu Asp Arg
 130 135 140
 His Ser Phe Asn Asp Ile Tyr Glu Lys Ile Leu Lys Asp Ile Gln Asn
 145 150 155 160
 Ala Gly Asn Ser Gly Glu Phe Tyr Thr Pro Arg Ala Ala Thr Asp Phe
 165 170 175
 Ile Ala Glu Val Leu Asp Pro Lys Leu Gly Glu Ser Met Ala Asp Leu
 180 185 190
 Ala Cys Gly Thr Gly Gly Phe Leu Thr Ser Thr Leu Asn Arg Leu Ser
 195 200 205
 Ser Gln Arg Lys Thr Ser Glu Asp Thr Lys Lys Tyr Asn Thr Ala Val
 210 215 220
 Phe Gly Ile Glu Lys Lys Ala Phe Pro His Leu Leu Ala Val Thr Asn
 225 230 235 240
 Leu Phe Leu His Glu Ile Asp Asp Pro Lys Ile Val His Gly Asn Thr
 245 250 255
 Leu Glu Lys Asn Val Arg Glu Tyr Thr Asp Asp Glu Lys Phe Asp Ile
 260 265 270

1028462_1.TXT

Ile Met Met Asn Pro Pro Phe Gly Gly Ser Glu Leu Glu Thr Ile Lys
 275 280 285

Asn Asn Phe Pro Ala Glu Leu Arg Ser Ser Glu Thr Ala Asp Leu Phe
 290 295 300

Met Ala Val Ile Met Tyr Arg Leu Lys Glu Asn Gly Arg Val Gly Val
 305 310 315 320

Ile Leu Pro Asp Gly Phe Leu Phe Gly Glu Gly Val Lys Thr Arg Leu
 325 330 335

Lys Gln Lys Leu Val Asp Glu Phe Asn Leu His Thr Ile Ile Arg Leu
 340 345 350

Pro His Ser Val Phe Ala Pro Tyr Thr Gly Ile His Thr Asn Ile Leu
 355 360 365

Phe Phe Asp Lys Thr Lys Lys Thr Glu Glu Thr Trp Phe Tyr Arg Leu
 370 375 380

Asp Met Pro Asp Gly Tyr Lys Asn Phe Ser Lys Thr Lys Pro Met Lys
 385 390 395 400

Ser Glu His Phe Asn Pro Val Arg Asp Trp Trp Glu Asn Arg Glu Glu
 405 410 415

Ile Leu Glu Gly Lys Phe Tyr Lys Ser Lys Ser Phe Thr Pro Ser Glu
 420 425 430

Leu Ala Glu Leu Asn Tyr Asn Leu Asp Gln Cys Asp Phe Pro Lys Glu
 435 440 445

Glu Glu Glu Ile Leu Asn Pro Phe Glu Leu Ile Gln Asn Tyr Gln Ala
 450 455 460

Glu Arg Ala Thr Leu Asn His Lys Ile Asp Asn Val Leu Ala Asp Ile
 465 470 475 480

Leu Gln Leu Leu Glu Asp Lys
 485

<210> 172

<211> 378

<212> PRT

<213> Streptococcus pneumoniae

<400> 172

1028462_1.TXT

Met Asn Asn Thr Glu Phe Tyr Asp Arg Leu Gly Val Ser Lys Asn Ala
 1 5 10 15
 Ser Ala Asp Glu Ile Lys Lys Ala Tyr Arg Lys Leu Ser Lys Lys Tyr
 20 25 30
 His Pro Asp Ile Asn Lys Glu Pro Gly Ala Glu Asp Lys Tyr Lys Glu
 35 40 45
 Val Gln Glu Ala Tyr Glu Thr Leu Ser Asp Asp Gln Lys Arg Ala Ala
 50 55 60
 Tyr Asp Gln Tyr Gly Ala Ala Gly Ala Asn Gly Gly Phe Gly Gly Ala
 65 70 75 80
 Gly Gly Phe Gly Gly Phe Asn Gly Ala Gly Gly Phe Gly Gly Phe Glu
 85 90 95
 Asp Ile Phe Ser Ser Phe Phe Gly Gly Gly Gly Ser Ser Arg Asn Pro
 100 105 110
 Asn Ala Pro Arg Gln Gly Asp Asp Leu Gln Tyr Arg Val Asn Leu Thr
 115 120 125
 Phe Glu Glu Ala Ile Phe Gly Thr Glu Lys Glu Val Lys Tyr His Arg
 130 135 140
 Glu Ala Gly Cys Arg Thr Cys Asn Gly Ser Gly Ala Lys Pro Gly Thr
 145 150 155 160
 Ser Pro Val Thr Cys Gly Arg Cys His Gly Ala Gly Val Ile Asn Val
 165 170 175
 Asp Thr Gln Thr Pro Leu Gly Met Met Arg Arg Gln Val Thr Cys Asp
 180 185 190
 Val Cys His Gly Arg Gly Lys Glu Ile Lys Tyr Pro Cys Thr Thr Cys
 195 200 205
 His Gly Thr Gly His Glu Lys Gln Ala His Ser Val His Val Lys Ile
 210 215 220
 Pro Ala Gly Val Glu Thr Gly Gln Gln Ile Arg Leu Ala Gly Gln Gly
 225 230 235 240
 Glu Ala Gly Phe Asn Gly Gly Pro Tyr Gly Asp Leu Tyr Val Val Val
 245 250 255

1028462_1.TXT

Ser Val Glu Ala Ser Asp Lys Phe Glu Arg Glu Gly Thr Thr Ile Phe
260 265 270

Tyr Asn Leu Asn Leu Asn Phe Val Gln Ala Ala Leu Gly Asp Thr Val
275 280 285

Asp Ile Pro Thr Val His Gly Asp Val Glu Leu Val Ile Pro Glu Gly
290 295 300

Thr Gln Thr Gly Lys Lys Phe Arg Leu Arg Ser Lys Gly Ala Pro Ser
305 310 315 320

Leu Arg Gly Gly Ala Val Gly Asp Gln Tyr Val Thr Val Asn Val Val
325 330 335

Thr Pro Thr Gly Leu Asn Asp Arg Gln Lys Val Ala Leu Lys Glu Phe
340 345 350

Ala Ala Ala Gly Asp Leu Lys Val Asn Pro Lys Lys Lys Gly Phe Phe
355 360 365

Asp His Ile Lys Asp Ala Phe Asp Gly Glu
370 375

<210> 173

<211> 453

<212> PRT

<213> Streptococcus pneumoniae

<400> 173

Met Asn Pro Asn Leu Phe Arg Ser Val Glu Phe Tyr Gln Arg Arg Tyr
1 5 10 15

His Asn Tyr Ala Thr Val Leu Ile Ile Pro Leu Ser Leu Leu Phe Thr
20 25 30

Phe Ile Leu Ile Phe Ser Leu Val Ala Thr Lys Glu Ile Thr Val Thr
35 40 45

Ser Gln Gly Glu Ile Ala Pro Thr Ser Val Ile Ala Ser Ile Gln Ser
50 55 60

Thr Ser Asp Asn Pro Ile Leu Ala Asn His Leu Val Ala Asn Gln Val
65 70 75 80

Val Glu Lys Gly Asp Leu Leu Ile Lys Tyr Ser Glu Thr Met Glu Glu
85 90 95

1028462_1.TXT

Ser Gln Lys Thr Ala Leu Ala Thr Gln Leu Gln Arg Leu Gln Lys Gln
 100 105 110
 Lys Glu Gly Leu Gly Ile Leu Lys Gln Ser Leu Glu Lys Ala Thr Asp
 115 120
 Leu Phe Ser Gly Glu Asp Glu Phe Gly Tyr His Asn Thr Phe Met Asn
 130 135 140
 Phe Thr Lys Gln Ser His Asp Ile Glu Leu Gly Ile Thr Lys Thr Asn
 145 150 155 160
 Thr Glu Val Ser Asn Gln Ala Asn Leu Ser Asn Ser Ser Ser Ser Ala
 165 170 175
 Ile Glu Gln Glu Ile Thr Lys Val Gln Gln Gln Ile Gly Glu Tyr Gln
 180 185 190
 Glu Leu Arg Asp Ala Ile Ile Asn Asn Arg Ala Arg Leu Pro Thr Gly
 195 200 205
 Asn Pro His Gln Ser Ile Leu Asn Arg Tyr Leu Val Ala Ser Gln Gly
 210 215 220
 Gln Thr Gln Gly Thr Ala Glu Glu Pro Phe Leu Ser Gln Ile Asn Gln
 225 230 235 240
 Ser Ile Ala Gly Leu Glu Ser Ser Ile Ala Ser Leu Lys Ile Gln Gln
 245 250 255
 Ala Gly Ile Gly Ser Val Ala Thr Tyr Asp Asn Ser Leu Ala Thr Lys
 260 265 270
 Ile Glu Val Leu Arg Thr Gln Phe Leu Gln Thr Ala Ser Gln Gln Gln
 275 280 285
 Leu Thr Val Glu Asn Gln Leu Thr Glu Leu Lys Val Gln Leu Asp Gln
 290 295 300
 Ala Thr Gln Arg Leu Glu Asn Asn Thr Leu Thr Ser Pro Ser Lys Gly
 305 310 315 320
 Ile Val His Leu Asn Ser Glu Phe Glu Gly Lys Asn Arg Ile Pro Thr
 325 330 335
 Gly Thr Glu Ile Ala Gln Ile Phe Pro Val Ile Thr Asp Thr Arg Glu
 340 345 350

1028462_1.TXT

Val Leu Ile Thr Tyr Tyr Val Ser Ser Asp Tyr Leu Pro Leu Leu Asp
 355 360 365

Lys Gly Gln Thr Val Arg Leu Lys Leu Glu Lys Ile Gly Asn His Gly
 370 375 380

Thr Thr Ile Ile Gly Gln Leu Gln Thr Ile Asp Gln Thr Pro Thr Arg
 385 390 395 400

Thr Glu Gln Gly Asn Leu Phe Lys Leu Thr Ala Leu Ala Lys Leu Ser
 405 410 415

Asn Glu Asp Ser Lys Leu Ile Gln Tyr Gly Leu Gln Gly Arg Val Thr
 420 425 430

Ser Val Thr Thr Lys Lys Thr Tyr Phe Asp Tyr Phe Lys Asp Lys Ile
 435 440 445

Leu Thr His Ser Asp
 450

<210> 174
 <211> 131
 <212> PRT
 <213> Streptococcus pneumoniae
 <400> 174

Met Ser Lys Lys Leu Asn Arg Lys Lys Gln Leu Arg Asn Gly Leu Arg
 1 5 10 15

Arg Ala Gly Ala Phe Ser Ser Thr Val Thr Lys Val Val Asp Glu Thr
 20 25 30

Lys Lys Val Val Lys Arg Ala Glu Gln Ser Ala Ser Ala Ala Gly Lys
 35 40 45

Ala Val Ser Lys Lys Val Glu Gln Ala Val Glu Ala Thr Lys Glu Gln
 50 55 60

Ala Gln Lys Val Ala Asn Ser Val Glu Asp Phe Ala Ala Asn Leu Gly
 65 70 75 80

Gly Leu Pro Leu Asp Arg Ala Lys Thr Phe Tyr Asp Glu Gly Ile Lys
 85 90 95

Ser Ala Ser Asp Phe Lys Asn Trp Thr Glu Lys Glu Leu Leu Ala Leu
 100 105 110

1028462_1.TXT

Lys Gly Ile Gly Pro Ala Thr Ile Lys Lys Leu Lys Glu Asn Gly Ile
115 120 125

Lys Phe Lys
130

<210> 175
<211> 254
<212> PRT
<213> Streptococcus pneumoniae

<400> 175

Leu Ile Ser Leu Phe Gly Leu Ala Ala Ala Lys Pro Val Gln Ala Asp
1 5 10 15

Thr Ser Ile Ala Asp Ile Gln Lys Arg Gly Glu Leu Val Val Gly Val
20 25 30

Lys Gln Asp Val Pro Asn Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr
35 40 45

Tyr Ser Gly Ile Glu Thr Asp Leu Ala Lys Met Val Ala Asp Glu Leu
50 55 60

Lys Val Lys Ile Arg Tyr Val Pro Val Thr Ala Gln Thr Arg Gly Pro
65 70 75 80

Leu Leu Asp Asn Glu Gln Val Asp Met Asp Ile Ala Thr Phe Thr Ile
85 90 95

Thr Asp Glu Arg Lys Lys Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr
100 105 110

Asp Ala Ser Gly Phe Leu Val Asn Lys Ser Ala Lys Ile Lys Lys Ile
115 120 125

Glu Asp Leu Asn Gly Lys Thr Ile Gly Val Ala Gln Gly Ser Ile Thr
130 135 140

Gln Arg Leu Ile Thr Glu Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys
145 150 155 160

Phe Val Glu Leu Gly Ser Tyr Pro Glu Leu Ile Thr Ser Leu His Ala
165 170 175

His Arg Ile Asp Thr Phe Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr
180 185 190

1028462_1.TXT

Thr Ser Lys Arg Thr Ala Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp
195 200 205

Tyr Gly Ile Val Thr Lys Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu
210 215 220

Asp Asn Leu Val Thr Lys Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu
225 230 235 240

Tyr Asp Arg Tyr Lys Leu Lys Pro Ser Ser His Thr Ala Asp
245 250

<210> 176
<211> 553
<212> PRT
<213> Streptococcus pneumoniae

<400> 176

Met Ser Asn Ile Ser Leu Thr Thr Leu Gly Gly Val Arg Glu Asn Gly
1 5 10 15

Lys Asn Met Tyr Ile Ala Glu Ile Gly Glu Ser Ile Phe Val Leu Asn
20 25 30

Val Gly Leu Lys Tyr Pro Glu Asn Glu Gln Leu Gly Val Asp Val Val
35 40 45

Ile Pro Asn Met Asp Tyr Leu Phe Glu Asn Ser Asp Arg Ile Ala Gly
50 55 60

Val Phe Leu Thr His Gly His Ala Asp Ala Ile Gly Ala Leu Pro Tyr
65 70 75 80

Leu Leu Ala Glu Ala Lys Val Pro Val Phe Gly Ser Glu Leu Thr Ile
85 90 95

Glu Leu Ala Lys Leu Phe Val Lys Gly Asn Asp Ala Val Lys Lys Phe
100 105 110

Asn Asp Phe His Val Ile Asp Glu Asn Thr Glu Ile Asp Phe Gly Gly
115 120 125

Thr Val Val Ser Phe Phe Pro Thr Thr Tyr Ser Val Pro Glu Ser Leu
130 135 140

Gly Ile Val Leu Lys Thr Ser Glu Gly Ser Ile Val Tyr Thr Gly Asp
145 150 155 160

1028462_1.TXT

Phe Lys Phe Asp Gln Thr Ala Ser Glu Ser Tyr Ala Thr Asp Phe Ala
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 Arg Leu Ala Glu Ile Gly Arg Asp Gly Val Leu Ala Leu Leu Ser Asp
 180 185 190
 Ser Ala Asn Ala Asp Ser Asn Ile Gln Val Ala Ser Glu Ser Glu Val
 195 200 205
 Arg Asp Glu Ile Thr Gln Thr Ile Ala Asp Trp Glu Gly Arg Ile Ile
 210 215 220
 Val Ala Ala Val Ser Ser Asn Leu Ser Arg Ile Gln Gln Ile Phe Asp
 225 230 235 240
 Ala Ala Asp Lys Thr Gly Arg Arg Ile Val Leu Thr Gly Phe Asp Ile
 245 250 255
 Glu Asn Ile Val Arg Thr Ala Ile Arg Leu Lys Lys Leu Ser Leu Ala
 260 265 270
 Asn Glu Ile Leu Leu Ile Lys Pro Lys Asp Met Ser Arg Phe Glu Asp
 275 280 285
 His Glu Leu Ile Ile Leu Glu Thr Gly Arg Met Gly Glu Pro Ile Asn
 290 295 300
 Gly Leu Arg Lys Met Ser Ile Gly Arg His Arg Tyr Val Glu Ile Lys
 305 310 315
 Asp Gly Asp Leu Val Tyr Ile Ala Thr Ala Pro Ser Ile Ala Lys Glu
 325 330 335
 Ala Phe Val Ala Arg Val Glu Asn Met Ile Tyr Gln Ala Gly Gly Val
 340 345 350
 Val Lys Leu Ile Thr Gln Ser Leu His Val Ser Gly His Gly Asn Val
 355 360 365
 Arg Asp Leu Gln Leu Met Ile Asn Leu Leu Gln Pro Lys Tyr Leu Phe
 370 375 380
 Pro Val Gln Gly Glu Tyr Arg Glu Leu Asp Ala His Ala Lys Ala Ala
 385 390 395 400
 Met Ala Val Gly Met Leu Pro Glu Arg Ile Phe Ile Pro Lys Lys Gly
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Thr Thr Met Ala Tyr Glu Asn Gly Asp Phe Val Pro Ala Gly Ser Val
420 425 430

Ser Ala Gly Asp Ile Leu Ile Asp Gly Asn Ala Ile Gly Asp Val Gly
435 440 445

Asn Val Val Leu Arg Asp Arg Lys Val Leu Ser Glu Asp Gly Ile Phe
450 455 460

Ile Val Ala Ile Thr Val Asn Arg Arg Glu Lys Ile Val Ala Arg
465 470 475 480

Ala Arg Val His Thr Arg Gly Phe Val Tyr Leu Lys Lys Ser Arg Asp
485 490 495

Ile Leu Arg Glu Ser Ser Glu Leu Ile Asn Gln Thr Val Glu Glu Tyr
500 505 510

Leu Gln Gly Asp Asp Phe Asp Trp Ala Asp Leu Lys Gly Lys Val Arg
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Asp Asn Leu Thr Lys Tyr Leu Phe Asp Gln Thr Lys Arg Arg Pro Ala
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Ile Leu Pro Val Val Met Glu Ala Lys
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<213> Streptococcus pneumoniae

<400> 177

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20 25 30

Glu Asp Ala Leu Asn Ile Ser Asp Lys Glu Lys Val Ala Glu Asn Lys
35 40 45

Glu Lys His Glu Asn Ile His Ser Ala Met Glu Thr Ser Gln Asp Phe
50 55 60

Lys Glu Lys Lys Thr Ala Val Ile Lys Glu Lys Glu Val Val Ser Lys
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65              70              75              80
Asn Pro Val Ile Asp Asn Asn Thr Ser Asn Glu Glu Ala Lys Ile Lys
      85              90
Glu Glu Asn Ser Asn Lys Ser Gln Gly Asp Tyr Thr Asp Ser Phe Val
      100             105
Asn Lys Asn Thr Glu Asn Pro Lys Lys Glu Asp Lys Val Val Tyr Ile
      115             120
Ala Glu Phe Lys Asp Lys Glu Ser Gly Glu Lys Ala Ile Lys Glu Leu
      130             135
Ser Ser Leu Lys Asn Thr Lys Val Leu Tyr Thr Tyr Asp Arg Ile Phe
      145             150             155
Asn Gly Ser Ala Ile Glu Thr Thr Pro Asp Asn Leu Asp Lys Ile Lys
      165             170             175
Gln Ile Glu Gly Ile Ser Ser Val Glu Arg Ala Gln Lys Val Gln Pro
      180             185             190
Met Met Asn His Ala Arg Lys Glu Ile Gly Val Glu Glu Ala Ile Asp
      195             200             205
Tyr Leu Lys Ser Ile Asn Ala Pro Phe Gly Lys Asn Phe Asp Gly Arg
      210             215             220
Gly Met Val Ile Ser Asn Ile Asp Thr Gly Thr Asp Tyr Arg His Lys
      225             230             235             240
Ala Met Arg Ile Asp Asp Asp Ala Lys Ala Ser Met Arg Phe Lys Lys
      245             250             255
Glu Asp Leu Lys Gly Thr Asp Lys Asn Tyr Trp Leu Ser Asp Lys Ile
      260             265             270
Pro His Ala Phe Asn Tyr Tyr Asn Gly Gly Lys Ile Thr Val Glu Lys
      275             280             285
Tyr Asp Asp Gly Arg Asp Tyr Phe Asp Pro His Gly Met His Ile Ala
      290             295             300
Gly Ile Leu Ala Gly Asn Asp Thr Glu Gln Asp Ile Lys Asn Phe Asn
      305             310             315             320

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1028462_1.TXT

Gly Ile Asp Gly Ile Ala Pro Asn Ala Gln Ile Phe Ser Tyr Lys Met
 325 330 335
 Tyr Ser Asp Ala Gly Ser Gly Phe Ala Gly Asp Glu Thr Met Phe His
 340 345 350
 Ala Ile Glu Asp Ser Ile Lys His Asn Val Asp Val Val Ser Val Ser
 355 360 365
 Ser Gly Phe Thr Gly Thr Gly Leu Val Gly Glu Lys Tyr Trp Gln Ala
 370 375 380
 Ile Arg Ala Leu Arg Lys Ala Gly Ile Pro Met Val Val Ala Thr Gly
 385 390 395
 Asn Tyr Ala Thr Ser Ala Ser Ser Ser Ser Trp Asp Leu Val Ala Asn
 405 410 415
 Asn His Leu Lys Met Thr Asp Thr Gly Asn Val Thr Arg Thr Ala Ala
 420 425 430
 His Glu Asp Ala Ile Ala Val Ala Ser Ala Lys Asn Gln Thr Val Glu
 435 440 445
 Phe Asp Lys Val Asn Ile Gly Gly Glu Ser Phe Lys Tyr Arg Asn Ile
 450 455 460
 Gly Ala Phe Phe Asp Lys Ser Lys Ile Thr Thr Asn Glu Asp Gly Thr
 465 470 475 480
 Lys Ala Pro Ser Lys Leu Lys Phe Val Tyr Ile Gly Lys Gly Gln Asp
 485 490 495
 Gln Asp Leu Ile Gly Leu Asp Leu Arg Gly Lys Ile Ala Val Met Asp
 500 505 510
 Arg Ile Tyr Thr Lys Asp Leu Lys Asn Ala Phe Lys Lys Ala Met Asp
 515 520 525
 Lys Gly Ala Arg Ala Ile Met Val Val Asn Thr Val Asn Tyr Tyr Asn
 530 535 540
 Arg Asp Asn Trp Thr Glu Leu Pro Ala Met Gly Tyr Glu Ala Asp Glu
 545 550 555 560
 Gly Thr Lys Ser Gln Val Phe Ser Ile Ser Gly Asp Asp Gly Val Lys
 565 570 575

1028462_1.TXT

Leu Trp Asn Met Ile Asn Pro Asp Lys Lys Thr Glu Val Lys Arg Asn
 580 585 590
 Asn Lys Glu Asp Phe Lys Asp Lys Leu Glu Gln Tyr Tyr Pro Ile Asp
 595 600 605
 Met Glu Ser Phe Asn Ser Asn Lys Pro Asn Val Gly Asp Glu Lys Glu
 610 615 620
 Ile Asp Phe Lys Phe Ala Pro Asp Thr Asp Lys Glu Leu Tyr Lys Glu
 625 630 635 640
 Asp Ile Ile Val Pro Ala Gly Ser Thr Ser Trp Gly Pro Arg Ile Asp
 645 650 655
 Leu Leu Leu Lys Pro Asp Val Ser Ala Pro Gly Lys Asn Ile Lys Ser
 660 665 670
 Thr Leu Asn Val Ile Asn Gly Lys Ser Thr Tyr Gly Tyr Met Ser Gly
 675 680 685
 Thr Ser Met Ala Thr Pro Ile Val Ala Ala Ser Thr Val Leu Ile Arg
 690 695 700
 Pro Lys Leu Lys Glu Met Leu Glu Arg Pro Val Leu Lys Asn Leu Lys
 705 710 715 720
 Gly Asp Asp Lys Ile Asp Leu Thr Ser Leu Thr Lys Ile Ala Leu Gln
 725 730 735
 Asn Thr Ala Arg Pro Met Met Asp Ala Thr Ser Trp Lys Glu Lys Ser
 740 745 750
 Gln Tyr Phe Ala Ser Pro Arg Gln Gln Gly Ala Gly Leu Ile Asn Val
 755 760 765
 Ala Asn Ala Leu Arg Asn Glu Val Val Ala Thr Phe Lys Asn Thr Asp
 770 775 780
 Ser Lys Gly Leu Val Asn Ser Tyr Gly Ser Ile Ser Leu Lys Glu Ile
 785 790 795 800
 Lys Gly Asp Lys Lys Tyr Phe Thr Ile Lys Leu His Asn Thr Ser Asn
 805 810 815
 Arg Pro Leu Thr Phe Lys Val Ser Ala Ser Ala Ile Thr Thr Asp Ser
 820 825 830

1028462_1.TXT

Leu Thr Asp Arg Leu Lys Leu Asp Glu Thr Tyr Lys Asp Glu Lys Ser
 835 840 845
 Pro Asp Gly Lys Gln Ile Val Pro Glu Ile His Pro Glu Lys Val Lys
 850 855 860
 Gly Ala Asn Ile Thr Phe Glu His Asp Thr Phe Thr Ile Gly Ala Asn
 865 870 875 880
 Ser Ser Phe Asp Leu Asn Ala Val Ile Asn Val Gly Glu Ala Lys Asn
 885 890 895
 Lys Asn Lys Phe Val Glu Ser Phe Ile His Phe Glu Ser Val Glu Glu
 900 905 910
 Met Glu Ala Leu Asn Ser Asn Gly Lys Lys Ile Asn Phe Gln Pro Ser
 915 920 925
 Leu Ser Met Pro Leu Met Gly Phe Ala Gly Asn Trp Asn His Glu Pro
 930 935 940
 Ile Leu Asp Lys Trp Ala Trp Glu Glu Gly Ser Arg Ser Lys Thr Leu
 945 950 955 960
 Gly Gly Tyr Asp Asp Asp Gly Lys Pro Lys Ile Pro Gly Thr Leu Asn
 965 970 975
 Lys Gly Ile Gly Gly Glu His Gly Ile Asp Lys Phe Asn Pro Ala Gly
 980 985 990
 Val Ile Gln Asn Arg Lys Asp Lys Asn Thr Thr Ser Leu Asp Gln Asn
 995 1000 1005
 Pro Glu Leu Phe Ala Phe Asn Asn Glu Gly Ile Asn Ala Pro Ser
 1010 1015 1020
 Ser Ser Gly Ser Lys Ile Ala Asn Ile Tyr Pro Leu Asp Ser Asn
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 1040 1045 1050
 Pro Leu Val Leu Arg Ser Ala Glu Glu Gly Leu Ile Ser Ile Val
 1055 1060 1065
 Asn Thr Asn Lys Glu Gly Glu Asn Gln Arg Asp Leu Lys Val Ile
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1070

1075

Ser Arg 1085	Glu His Phe Ile	Arg 1090	Gly Ile Leu Asn	Ser 1095	Lys Ser Asn
Asp Ala 1100	Lys Gly Ile Lys	Ser 1105	Ser Lys Leu Lys	Val 1110	Trp Gly Asp
Leu Lys 1115	Trp Asp Gly Leu	Ile 1120	Tyr Asn Pro Arg	Gly 1125	Arg Glu Glu
Asn Ala 1130	Pro Glu Ser Lys	Asp 1135	Asn Gln Asp Pro	Ala 1140	Thr Lys Ile
Arg Gly 1145	Gln Phe Glu Pro	Ile 1150	Ala Glu Gly Gln	Tyr 1155	Phe Tyr Lys
Phe Lys 1160	Tyr Arg Leu Thr	Lys 1165	Asp Tyr Pro Trp	Gln 1170	Val Ser Tyr
Ile Pro 1175	Val Lys Ile Asp	Asn 1180	Thr Ala Pro Lys	Ile 1185	Val Ser Val
Asp Phe 1190	Ser Asn Pro Glu	Lys 1195	Ile Lys Leu Ile	Thr 1200	Lys Asp Thr
Tyr His 1205	Lys Val Lys Asp	Gln 1210	Tyr Lys Asn Glu	Thr 1215	Leu Phe Ala
Arg Asp 1220	Gln Lys Glu His	Pro 1225	Glu Lys Phe Asp	Glu 1230	Ile Ala Asn
Glu Val 1235	Trp Tyr Ala Gly	Ala 1240	Ala Leu Val Asn	Glu 1245	Asp Gly Glu
Val Glu 1250	Lys Asn Leu Glu	Val 1255	Thr Tyr Ala Gly	Glu 1260	Gly Gln Gly
Arg Asn 1265	Arg Lys Leu Asp	Lys 1270	Asp Gly Asn Thr	Ile 1275	Tyr Glu Ile
Lys Gly 1280	Ala Gly Asp Leu	Arg 1285	Gly Lys Ile Ile	Glu 1290	Val Ile Ala
Leu Asp 1295	Gly Ser Ser Asn	Phe 1300	Thr Lys Ile His	Arg 1305	Ile Lys Phe

1028462_1.TXT

Ala Asn Gln Ala Asp Glu Lys Gly Met Ile Ser Tyr Tyr Leu Val
 1310 1315 1320
 Asp Pro Asp Gln Asp Ser Ser Lys Tyr Gln Lys Leu Gly Glu Ile
 1325 1330 1335
 Ala Glu Ser Lys Phe Lys Asn Leu Gly Asn Gly Lys Glu Gly Ser
 1340 1345 1350
 Leu Lys Lys Asp Thr Thr Gly Val Glu His His His Gln Glu Asn
 1355 1360 1365
 Glu Glu Ser Ile Lys Glu Lys Ser Ser Phe Thr Ile Asp Arg Asn
 1370 1375 1380
 Ile Ser Thr Ile Arg Asp Phe Glu Asn Lys Asp Leu Lys Lys Leu
 1385 1390 1395
 Ile Lys Lys Lys Phe Arg Glu Val Asp Asp Phe Thr Ser Glu Thr
 1400 1405 1410
 Gly Lys Arg Met Glu Glu Tyr Asp Tyr Lys Tyr Asp Asp Lys Gly
 1415 1420 1425
 Asn Ile Ile Ala Tyr Asp Asp Gly Thr Asp Leu Glu Tyr Glu Thr
 1430 1435 1440
 Glu Lys Leu Asp Glu Ile Lys Ser Lys Ile Tyr Gly Val Leu Ser
 1445 1450 1455
 Pro Ser Lys Asp Gly His Phe Glu Ile Leu Gly Lys Ile Ser Asn
 1460 1465 1470
 Val Ser Lys Asn Ala Lys Val Tyr Tyr Gly Asn Asn Tyr Lys Ser
 1475 1480 1485
 Ile Glu Ile Lys Ala Thr Lys Tyr Asp Phe His Ser Lys Thr Met
 1490 1495 1500
 Thr Phe Asp Leu Tyr Ala Asn Ile Asn Asp Ile Val Asp Gly Leu
 1505 1510 1515
 Ala Phe Ala Gly Asp Met Arg Leu Phe Val Lys Asp Asn Asp Gln
 1520 1525 1530
 Lys Lys Ala Glu Ile Lys Ile Arg Met Pro Glu Lys Ile Lys Glu
 1535 1540 1545

1028462_1.TXT

Thr	Lys 1550	Ser	Glu	Tyr	Pro	Tyr 1555	Val	Ser	Ser	Tyr	Gly 1560	Asn	Val	Ile
Glu	Leu 1565	Gly	Glu	Gly	Asp	Leu 1570	Ser	Lys	Asn	Lys	Pro 1575	Asp	Asn	Leu
Thr	Lys 1580	Met	Glu	Ser	Gly	Lys 1585	Ile	Tyr	Ser	Asp	Ser 1590	Glu	Lys	Gln
Gln	Tyr 1595	Leu	Leu	Lys	Asp	Asn 1600	Ile	Ile	Leu	Arg	Lys 1605	Gly	Tyr	Ala
Leu	Lys 1610	Val	Thr	Thr	Tyr	Asn 1615	Pro	Gly	Lys	Thr	Asp 1620	Met	Leu	Glu
Gly	Asn 1625	Gly	Val	Tyr	Ser	Lys 1630	Glu	Asp	Ile	Ala	Lys 1635	Ile	Gln	Lys
Ala	Asn 1640	Pro	Asn	Leu	Arg	Ala 1645	Leu	Ser	Glu	Thr	Thr 1650	Ile	Tyr	Ala
Asp	Ser 1655	Arg	Asn	Val	Glu	Asp 1660	Gly	Arg	Ser	Thr	Gln 1665	Ser	Val	Leu
Met	Ser 1670	Ala	Leu	Asp	Gly	Phe 1675	Asn	Ile	Ile	Arg	Tyr 1680	Gln	Val	Phe
Thr	Phe 1685	Lys	Met	Asn	Asp	Lys 1690	Gly	Glu	Ala	Ile	Asp 1695	Lys	Asp	Gly
Asn	Leu 1700	Val	Thr	Asp	Ser	Ser 1705	Lys	Leu	Val	Leu	Phe 1710	Gly	Lys	Asp
Asp	Lys 1715	Glu	Tyr	Thr	Gly	Glu 1720	Asp	Lys	Phe	Asn	Val 1725	Glu	Ala	Ile
Lys	Glu 1730	Asp	Gly	Ser	Met	Leu 1735	Phe	Ile	Asp	Thr	Lys 1740	Pro	Val	Asn
Leu	Ser 1745	Met	Asp	Lys	Asn	Tyr 1750	Phe	Asn	Pro	Ser	Lys 1755	Ser	Asn	Lys
Ile	Tyr 1760	Val	Arg	Asn	Pro	Glu 1765	Phe	Tyr	Leu	Arg	Gly 1770	Lys	Ile	Ser
Asp	Lys 1775	Gly	Gly	Phe	Asn	Trp 1780	Glu	Leu	Arg	Val	Asn 1785	Glu	Ser	Val

1028462_1.TXT

Val Asp Asn Tyr Leu Ile Tyr Gly Asp Leu His Ile Asp Asn Thr
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 Arg Asp Phe Asn Ile Lys Leu Asn Val Lys Asp Gly Asp Ile Met
 1805 1810 1815
 Asp Trp Gly Met Lys Asp Tyr Lys Ala Asn Gly Phe Pro Asp Lys
 1820 1825 1830
 Val Thr Asp Met Asp Gly Asn Val Tyr Leu Gln Thr Gly Tyr Ser
 1835 1840 1845
 Asp Leu Asn Ala Lys Ala Val Gly Val His Tyr Gln Phe Leu Tyr
 1850 1855 1860
 Asp Asn Val Lys Pro Glu Val Asn Ile Asp Pro Lys Gly Asn Thr
 1865 1870 1875
 Ser Ile Glu Tyr Ala Asp Gly Lys Ser Val Val Phe Asn Ile Asn
 1880 1885 1890
 Asp Lys Arg Asn Asn Gly Phe Asp Gly Glu Ile Gln Glu Gln His
 1895 1900 1905
 Ile Tyr Ile Asn Gly Lys Glu Tyr Thr Ser Phe Asn Asp Ile Lys
 1910 1915 1920
 Gln Ile Ile Asp Lys Thr Leu Asn Ile Lys Ile Val Val Lys Asp
 1925 1930 1935
 Phe Ala Arg Asn Thr Thr Val Lys Glu Phe Ile Leu Asn Lys Asp
 1940 1945 1950
 Thr Gly Glu Val Ser Glu Leu Lys Pro His Arg Val Thr Val Thr
 1955 1960 1965
 Ile Gln Asn Gly Lys Glu Met Ser Ser Thr Ile Val Ser Glu Glu
 1970 1975 1980
 Asp Phe Ile Leu Pro Val Tyr Lys Gly Glu Leu Glu Lys Gly Tyr
 1985 1990 1995
 Gln Phe Asp Gly Trp Glu Ile Ser Gly Phe Glu Gly Lys Lys Asp
 2000 2005 2010
 Ala Gly Tyr Val Ile Asn Leu Ser Lys Asp Thr Phe Ile Lys Pro
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2015

2020

Val Phe Lys Lys Ile Glu Glu Lys Lys Glu Glu Glu Asn Lys Pro
 2030 2035 2040
 Thr Phe Asp Val Ser Lys Lys Lys Asp Asn Pro Gln Val Asn His
 2045 2050 2055
 Ser Gln Leu Asn Glu Ser His Arg Lys Glu Asp Leu Gln Arg Glu
 2060 2065 2070
 Glu His Ser Gln Lys Ser Asp Ser Thr Lys Asp Val Thr Ala Thr
 2075 2080
 Val Leu Asp Lys Asn Asn Ile Ser Ser Lys Ser Thr Thr Asn Asn
 2090 2095 2100
 Pro Asn Lys Leu Pro Lys Thr Gly Thr Ala Ser Gly Ala Gln Thr
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 Glu Glu Lys Ala Asp Lys Ala Leu Glu Thr Lys Asn Ile Val Glu Arg
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 Thr Glu Gln Ser Glu Pro Ser Ser Thr Glu Ala Ile Ala Ser Glu Lys

Lys Glu Asp Glu Ala Val Thr Pro Lys Glu Glu Lys Val Ser Ala Lys
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 Pro Glu Glu Lys Ala Pro Arg Ile Glu Ser Gln Ala Ser Asn Gln Glu
 115 120 125
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 130 135 140
 Gln Met Ile Glu Asp Arg Lys Val Asp Phe Asn Gln Asn Trp Tyr Phe
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 Lys Leu Asn Ala Asn Ser Lys Glu Ala Ile Lys Pro Asp Ala Asp Val
 165 170 175
 Ser Thr Trp Lys Lys Leu Asp Leu Pro Tyr Asp Trp Ser Ile Phe Asn
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 Asp Phe Asp His Glu Ser Pro Ala Gln Asn Glu Gly Gly Gln Leu Asn
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 Gly Gly Glu Ala Trp Tyr Arg Lys Thr Phe Lys Leu Asp Glu Lys Asp
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 Leu Lys Lys Asn Val Arg Leu Thr Phe Asp Gly Val Tyr Met Asp Ser
 225 230 235 240
 Gln Val Tyr Val Asn Gly Gln Leu Val Gly His Tyr Pro Asn Gly Tyr
 245 250 255
 Asn Gln Phe Ser Tyr Asp Ile Thr Lys Tyr Leu Gln Lys Asp Gly Arg
 260 265 270
 Glu Asn Val Ile Ala Val His Ala Val Asn Lys Gln Pro Ser Ser Arg
 275 280 285
 Trp Tyr Ser Gly Ser Gly Ile Tyr Arg Asp Val Thr Leu Gln Val Thr
 290 295 300
 Asp Lys Val His Val Glu Lys Asn Gly Thr Thr Ile Leu Thr Pro Lys
 305 310 315 320
 Leu Glu Glu Gln Gln His Gly Lys Val Glu Thr His Val Thr Ser Lys
 325 330 335

1028462_1.TXT

Ile Val Asn Thr Asp Asp Lys Asp His Glu Leu Val Ala Glu Tyr Gln
 340 345 350

Ile Val Glu Arg Gly Gly His Ala Val Thr Gly Leu Val Arg Thr Ala
 355 360 365

Ser Arg Thr Leu Lys Ala His Glu Ser Thr Ser Leu Asp Ala Ile Leu
 370 375 380

Glu Val Glu Arg Pro Lys Leu Trp Thr Val Leu Asn Asp Lys Pro Ala
 385 390 395 400

Leu Tyr Glu Leu Ile Thr Arg Val Tyr Arg Asp Gly Gln Leu Val Asp
 405 410 415

Ala Lys Lys Asp Leu Phe Gly Tyr Arg Tyr Tyr His Trp Thr Pro Asn
 420 425 430

Glu Gly Phe Ser Leu Asn Gly Glu Arg Ile Lys Phe His Gly Val Ser
 435 440 445

Leu His His Asp His Gly Ala Leu Gly Ala Glu Glu Asn Tyr Lys Ala
 450 455 460

Glu Tyr Arg Arg Leu Lys Gln Met Lys Glu Met Gly Val Asn Ser Ile
 465 470 475 480

Arg Thr Thr His Asn Pro Ala Ser Glu Gln Thr Leu Gln Ile Ala Ala
 485 490 495

Glu Leu Gly Leu Leu Val Gln Glu Glu Ala Phe Asp Thr Trp Tyr Gly
 500 505 510

Gly Lys Lys Pro Tyr Asp Tyr Gly Arg Phe Phe Glu Lys Asp Ala Thr
 515 520 525

His Pro Glu Ala Arg Lys Gly Glu Lys Trp Ser Asp Phe Asp Leu Arg
 530 535 540

Thr Met Val Glu Arg Gly Lys Asn Asn Pro Ala Ile Phe Met Trp Ser
 545 550 555 560

Ile Gly Asn Glu Ile Gly Glu Ala Asn Gly Asp Ala His Ser Leu Ala
 565 570 575

Thr Val Lys Arg Leu Val Lys Val Ile Lys Asp Val Asp Lys Thr Arg
 580 585 590

1028462_1.TXT

Tyr Val Thr Met Gly Ala Asp Lys Phe Arg Phe Gly Asn Gly Ser Gly
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 Gly His Glu Lys Ile Ala Asp Glu Leu Asp Ala Val Gly Phe Asn Tyr
 610 615
 Ser Glu Asp Asn Tyr Lys Ala Leu Arg Ala Lys His Pro Lys Trp Leu
 625 630 635 640
 Ile Tyr Gly Ser Glu Thr Ser Ser Ala Thr Arg Thr Arg Gly Ser Tyr
 645 650 655
 Tyr Arg Pro Glu Arg Glu Leu Lys His Ser Asn Gly Pro Glu Arg Asn
 660 665 670
 Tyr Glu Gln Ser Asp Tyr Gly Asn Asp Arg Val Gly Trp Gly Lys Thr
 675 680 685
 Ala Thr Ala Ser Trp Thr Phe Asp Arg Asp Asn Ala Gly Tyr Ala Gly
 690 695 700
 Gln Phe Ile Trp Thr Gly Thr Asp Tyr Ile Gly Glu Pro Thr Pro Trp
 705 710 715 720
 His Asn Gln Asn Gln Thr Pro Val Lys Ser Ser Tyr Phe Gly Ile Val
 725 730 735
 Asp Thr Ala Gly Ile Pro Lys His Asp Phe Tyr Leu Tyr Gln Ser Gln
 740 745 750
 Trp Val Ser Val Lys Lys Lys Pro Met Val His Leu Leu Pro His Trp
 755 760 765
 Asn Trp Glu Asn Lys Glu Leu Ala Ser Lys Val Ala Asp Ser Glu Gly
 770 775 780
 Lys Ile Pro Val Arg Ala Tyr Ser Asn Ala Ser Ser Val Glu Leu Phe
 785 790 795 800
 Leu Asn Gly Lys Ser Leu Gly Leu Lys Thr Phe Asn Lys Lys Gln Thr
 805 810 815
 Ser Asp Gly Arg Thr Tyr Gln Glu Gly Ala Asn Ala Asn Glu Leu Tyr
 820 825 830
 Leu Glu Trp Lys Val Ala Tyr Gln Pro Gly Thr Leu Glu Ala Ile Ala
 835 840 845

1028462_1.TXT

Arg Asp Glu Ser Gly Lys Glu Ile Ala Arg Asp Lys Ile Thr Thr Ala
 850 855 860
 Gly Lys Pro Ala Ala Val Arg Leu Ile Lys Glu Asp His Ala Ile Ala
 865 870 875 880
 Ala Asp Gly Lys Asp Leu Thr Tyr Ile Tyr Tyr Glu Ile Val Asp Ser
 885 890 895
 Gln Gly Asn Val Val Pro Thr Ala Asn Asn Leu Val Arg Phe Gln Leu
 900 905 910
 His Gly Gln Gly Gln Leu Val Gly Val Asp Asn Gly Glu Gln Ala Ser
 915 920 925
 Arg Glu Arg Tyr Lys Ala Gln Ala Asp Gly Ser Trp Ile Arg Lys Ala
 930 935 940
 Phe Asn Gly Lys Gly Val Ala Ile Val Lys Ser Thr Glu Gln Ala Gly
 945 950 955 960
 Lys Phe Thr Leu Thr Ala His Ser Asp Leu Leu Lys Ser Asn Gln Val
 965 970 975
 Thr Val Phe Thr Gly Lys Lys Glu Gly Gln Glu Lys Thr Val Leu Gly
 980 985 990
 Thr Glu Val Pro Lys Val Gln Thr Ile Ile Gly Glu Ala Pro Glu Met
 995 1000 1005
 Pro Thr Thr Val Pro Phe Val Tyr Ser Asp Gly Ser Arg Ala Glu
 1010 1015 1020
 Arg Pro Val Thr Trp Ser Ser Val Asp Val Ser Lys Pro Gly Ile
 1025 1030 1035
 Val Thr Val Lys Gly Met Ala Asp Gly Arg Glu Val Glu Ala Arg
 1040 1045 1050
 Val Glu Val Ile Ala Leu Lys Ser Glu Leu Pro Val Val Lys Arg
 1055 1060 1065
 Ile Ala Pro Asn Thr Asp Leu Asn Ser Val Asp Lys Ser Val Ser
 1070 1075 1080
 Tyr Val Leu Ile Asp Gly Ser Val Glu Glu Tyr Glu Val Asp Lys
 Page 203

1085

1090

Trp Glu Ile Ala Glu Glu Asp Lys Ala Lys Leu Ala Ile Pro Gly
 1100 1105 1110
 Ser Arg Ile Gln Ala Thr Gly Tyr Leu Glu Gly Gln Pro Ile His
 1115 1120 1125
 Ala Thr Leu Val Val Glu Glu Gly Asn Pro Ala Ala Pro Ala Val
 1130 1135 1140
 Pro Thr Val Thr Val Gly Gly Glu Ala Val Thr Gly Leu Thr Ser
 1145 1150 1155
 Gln Lys Pro Met Gln Tyr Arg Thr Leu Ala Tyr Gly Ala Lys Leu
 1160 1165 1170
 Pro Glu Val Thr Ala Ser Ala Lys Asn Ala Ala Val Thr Val Leu
 1175 1180 1185
 Gln Ala Ser Ala Ala Asn Gly Met Arg Ala Ser Ile Phe Ile Gln
 1190 1195 1200
 Pro Lys Asp Gly Gly Pro Leu Gln Thr Tyr Ala Ile Gln Phe Leu
 1205 1210 1215
 Glu Glu Ala Pro Lys Ile Ala His Leu Ser Leu Gln Val Glu Lys
 1220 1225 1230
 Ala Asp Ser Leu Lys Glu Asp Gln Thr Val Lys Leu Ser Val Arg
 1235 1240 1245
 Ala His Tyr Gln Asp Gly Thr Gln Ala Val Leu Pro Ala Asp Lys
 1250 1255 1260
 Val Thr Phe Ser Thr Ser Gly Glu Gly Glu Val Ala Ile Arg Lys
 1265 1270 1275
 Gly Met Leu Glu Leu His Lys Pro Gly Ala Val Thr Leu Asn Ala
 1280 1285 1290
 Glu Tyr Glu Gly Ala Lys Asp Gln Val Glu Leu Thr Ile Gln Ala
 1295 1300 1305
 Asn Thr Glu Lys Lys Ile Ala Gln Ser Ile Arg Pro Val Asn Val
 1310 1315 1320

1028462_1.TXT

Val Thr Asp Leu His Gln Glu Pro Ser Leu Pro Ala Thr Val Thr
 1325 1330 1335
 Val Glu Tyr Asp Lys Gly Phe Pro Lys Thr His Lys Val Thr Trp
 1340 1345 1350
 Gln Ala Ile Pro Lys Glu Lys Leu Asp Ser Tyr Gln Thr Phe Glu
 1355 1360 1365
 Val Leu Gly Lys Val Glu Gly Ile Asp Leu Glu Ala Arg Ala Lys
 1370 1375 1380
 Val Ser Val Glu Gly Ile Val Ser Val Glu Glu Val Ser Val Thr
 1385 1390 1395
 Thr Pro Ile Ala Glu Ala Pro Gln Leu Pro Glu Ser Val Arg Thr
 1400 1405 1410
 Tyr Asp Ser Asn Gly His Val Ser Ser Ala Lys Val Ala Trp Asp
 1415 1420 1425
 Ala Ile Arg Pro Glu Gln Tyr Ala Lys Glu Gly Val Phe Thr Val
 1430 1435 1440
 Asn Gly Arg Leu Glu Gly Thr Gln Leu Thr Thr Lys Leu His Val
 1445 1450 1455
 Arg Val Ser Ala Gln Thr Glu Gln Gly Ala Asn Ile Ser Asp Gln
 1460 1465 1470
 Trp Thr Gly Ser Glu Leu Pro Leu Ala Phe Ala Ser Asp Ser Asn
 1475 1480 1485
 Pro Ser Asp Pro Val Ser Asn Val Asn Asp Lys Leu Ile Ser Tyr
 1490 1495 1500
 Asn Asn Gln Pro Ala Asn Arg Trp Thr Asn Trp Asn Arg Thr Asn
 1505 1510 1515
 Pro Glu Ala Ser Val Gly Val Leu Phe Gly Asp Ser Gly Ile Leu
 1520 1525 1530
 Ser Lys Arg Ser Val Asp Asn Leu Ser Val Gly Phe His Glu Asp
 1535 1540 1545
 His Gly Val Gly Val Pro Lys Ser Tyr Val Ile Glu Tyr Tyr Val
 1550 1555 1560

1028462_1.TXT

Gly Lys Thr Val Pro Thr Ala Pro Lys Asn Pro Ser Phe Val Gly
 1565 1570 1575
 Asn Glu Asp His Val Phe Asn Asp Ser Ala Asn Trp Lys Pro Val
 1580 1585 1590
 Thr Asn Leu Lys Ala Pro Ala Gln Leu Lys Ala Gly Glu Met Asn
 1595 1600 1605
 His Phe Ser Phe Asp Lys Val Glu Thr Tyr Ala Val Arg Ile Arg
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 Arg Ile Gln Val Asp Gly Lys Asp Leu Ala Asn Phe Asn Pro Asp
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 1685 1690 1695
 Ser Val Arg Glu Gly Glu Pro Val Arg Val Ile Ala Lys Ala Glu
 1700 1705 1710
 Asn Gly Asp Ile Leu Gly Glu Tyr Arg Leu His Phe Thr Lys Asp
 1715 1720 1725
 Lys Ser Leu Leu Ser His Lys Pro Val Ala Ala Val Lys Gln Ala
 1730 1735 1740
 Arg Leu Leu Gln Val Gly Gln Ala Leu Glu Leu Pro Thr Lys Val
 1745 1750 1755
 Pro Val Tyr Phe Thr Gly Lys Asp Gly Tyr Glu Thr Lys Asp Leu
 1760 1765 1770
 Thr Val Glu Trp Glu Glu Val Pro Ala Glu Asn Leu Thr Lys Ala
 1775 1780 1785
 Gly Gln Phe Thr Val Arg Gly Arg Val Leu Gly Ser Asn Leu Val
 1790 1795 1800

1028462_1.TXT

Ala Glu Ile Thr Val Arg Val Thr Asp Lys Leu Gly Glu Thr Leu
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 Ser Ala Thr Asn Asp Ile Asp Lys Asn Ser His Asp Arg Val Asp
 1835 1840 1845
 Tyr Leu Asn Asp Gly Asp His Ser Glu Asn Arg Arg Trp Thr Asn
 1850 1855 1860
 Trp Ser Pro Thr Pro Ser Ser Asn Pro Glu Val Ser Ala Gly Val
 1865 1870 1875
 Ile Phe Arg Glu Asn Gly Lys Ile Val Glu Arg Thr Val Thr Gln
 1880 1885 1890
 Gly Lys Val Gln Phe Phe Ala Asp Ser Gly Thr Asp Ala Pro Ser
 1895 1900 1905
 Lys Leu Val Leu Glu Arg Tyr Val Gly Pro Glu Phe Glu Val Pro
 1910 1915 1920
 Thr Tyr Tyr Ser Asn Tyr Gln Ala Tyr Asp Ala Asp His Pro Phe
 1925 1930 1935
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 1940 1945 1950
 Asp Ile Ala Ala Gly Asp Glu Ile Asn Val Thr Phe Lys Ala Ile
 1955 1960 1965
 Lys Ala Lys Ala Met Arg Trp Arg Met Glu Arg Lys Ala Asp Lys
 1970 1975 1980
 Ser Gly Val Ala Met Ile Glu Met Thr Phe Leu Ala Pro Ser Glu
 1985 1990 1995
 Leu Pro Gln Glu Ser Thr Gln Ser Lys Ile Leu Val Asp Gly Lys
 2000 2005 2010
 Glu Leu Ala Asp Phe Ala Glu Asn Arg Gln Asp Tyr Gln Ile Thr
 2015 2020 2025
 Tyr Lys Gly Gln Arg Pro Lys Val Ser Val Glu Glu Asn Asn Gln
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2030

2035

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2045 2050 2055

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2060 2065 2070

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Glu Lys Ala Asp Thr Lys Pro Ile Asp Ser Ser Glu Ala Ser Gln
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Thr Asn Lys Ala Gln Leu Pro Ser Thr Gly Ser Ala Ala Ser Gln
2195 2200 2205

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2225 2230

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<212> PRT
<213> Streptococcus pneumoniae

<400> 179

Met Ala Pro Ser Val Val Asp Ala Ala Thr Tyr His Tyr Val Asn Lys
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Pro Gly Glu Val Thr Val Val Glu Val Glu Thr Pro Gln Ser Ile Thr
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Pro Lys Ser Glu Val Lys Pro Thr Asp Asp Thr Leu Pro Lys Val Glu
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225               230               235
Ser Gln Pro Ser Asp Lys Pro Ala Glu Glu Ser Lys Val Glu Gln Ala
245               250               255

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 Glu Pro Lys Glu Glu Thr Val Asn Gln Ser Ile Glu Gln Pro Lys Val
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 325 330 335
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 580 585 590
 Glu Tyr Tyr Lys Glu Tyr Thr Leu Ser Thr Thr Met Ile Tyr Asp Arg
 595 600 605
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 660 665 670
 Lys Thr Thr Leu Leu Ala Val Lys Asn Ile Glu Glu Thr Thr Val Asn
 675 680 685
 Gly Thr Pro Val Tyr Lys Val Thr Ala Ile Ala Asp Asn Leu Val Ser
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 725 730 735
 Val Glu Ala Ile Gln Asn Asp Pro Ser Lys Glu Tyr Arg Leu Gly Gln
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 755 760 765

1028462_1.TXT

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 Ile Asn Asn Val Asn Phe Glu Asn Val Glu Ile Glu Arg Ser Gly Gln
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 Asp Asn Ile Ala Ser Leu Ala Asn Thr Met Lys Gly Ser Ser Val Ile
 820 825 830
 Thr Asn Val Lys Ile Thr Gly Thr Leu Ser Gly Arg Asn Asn Val Ala
 835 840 845
 Gly Phe Val Asn Asn Met Asn Asp Gly Thr Arg Ile Glu Asn Val Ala
 850 855 860
 Phe Phe Gly Lys Leu His Ser Thr Ser Gly Asn Gly Ser His Thr Gly
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 915 920 925
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 980 985 990
 Asp Leu Tyr Ala Val Glu Gly Tyr Ser Ser Gly Asn Arg Ser Phe Arg
 995 1000 1005
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1010

1015

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Glu Lys Leu Ile Pro Phe Tyr Asn Lys Asp Tyr Ile Val Tyr Gln	1070	1075	1080
Gly Asn Lys Leu Asn Lys Glu His His Leu Asn Thr Lys Glu Val	1085	1090	1095
Leu Ser Val Thr Ala Met Asn Asn Asn Glu Phe Ile Thr Asn Leu	1100	1105	1110
Asp Glu Ala Asn Lys Ile Ile Val His Tyr Ala Asp Gly Thr Lys	1115	1120	1125
Asp Tyr Phe Asn Leu Ser Ser Ser Glu Gly Leu Ser Asn Val	1130	1135	1140
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Ile Val Gln Lys Asp Asn Thr Thr Leu Val Asn Asp Ile Lys Ser	1160	1165	1170
Ile Leu Glu Ser Val Glu Leu Gln Ser Gln Thr Met Tyr Gln His	1175	1180	1185
Leu Asn Arg Leu Gly Asp Tyr Arg Val Asn Ala Ile Lys Asp Leu	1190	1195	1200
Tyr Leu Glu Glu Ser Phe Thr Asp Val Lys Glu Asn Leu Thr Asn	1205	1210	1215
Leu Ile Thr Lys Leu Val Gln Asn Glu Glu His Gln Leu Asn Asp	1220	1225	1230
Ser Pro Ala Ala Arg Gln Met Ile Arg Asp Lys Val Glu Lys Asn	1235	1240	1245

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 1265 1270 1275
 Lys Pro Asp Phe Tyr Gly Glu Lys Val Ser Val Leu Asp Arg Leu
 1280 1285 1290
 Ile Glu Ile Gly Ser Lys Glu Asn Asn Ile Lys Gly Ser Arg Thr
 1295 1300 1305
 Phe Asp Ala Phe Gly Gln Val Leu Ala Lys Tyr Thr Lys Ser Gly
 1310 1315 1320
 Asn Leu Asp Ala Phe Leu Asn Tyr Asn Arg Gln Leu Phe Thr Asn
 1325 1330 1335
 Ile Asp Asn Met Asn Asp Trp Phe Ile Asp Ala Thr Glu Asp His
 1340 1345 1350
 Val Tyr Ile Ala Glu Arg Ala Ser Glu Val Glu Glu Ile Lys Asn
 1355 1360 1365
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 1370 1375 1380
 Asn Thr Ile Leu Pro Leu Leu Asn Ile Asp Lys Ala His Leu Tyr
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 Ala Ala Asp Gly Tyr Arg Asn Tyr Tyr Asp Phe Trp Tyr Arg Leu
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 Tyr Gly Arg Tyr Asn Thr Asp Lys Val Tyr Thr Pro Leu Arg Glu
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1028462_1.TXT

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 Val Tyr Thr His Glu Thr Thr His Val Asn Asp Arg Ala Ile Tyr
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 Leu Gly Gly Phe Gly His Arg Glu Gly Thr Asp Ala Glu Ala Tyr
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 Asp Gly Asn Gln Trp Tyr Ile Thr Asp Pro Lys Thr Leu Lys Thr
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 Thr Leu Leu Asp Glu Ile Glu Ala Glu Ser Val Ile Ser Gln Gln
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 Tyr Arg Asp Asn Asn Lys Leu Asn Gln Trp Asp Lys Ile Arg Asn
 1655 1660 1665
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 Asp Leu Val Asp Gln Gln Leu Met Thr Asn Arg Asn Pro Gly Asn
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 Gly Ile Tyr Lys Pro Glu Ala Ile Ser Tyr Asn Asp Gln Ser Pro
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 Tyr Val Gly Val Arg Met Met Thr Gly Ile Tyr Gly Gly Asn Thr
 1715 1720 1725

1028462_1.TXT

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 Val Leu Ser Asp Glu Tyr Ile Ile Lys Lys Ile Ser Asn Asn Thr
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 Phe Asn Thr Ile Glu Glu Phe Lys Lys Ala Tyr Phe Lys Glu Val
 1790 1795 1800
 Lys Asp Lys Ala Thr Lys Gly Leu Thr Thr Phe Glu Val Asn Gly
 1805 1810 1815
 Ser Ser Val Ser Ser Tyr Asp Asp Leu Leu Thr Leu Phe Lys Glu
 1820 1825 1830
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 1835 1840 1845
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1028462_1.TXT

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 Val Lys Gln Asp Gly Ala Trp Tyr Tyr Phe Asp Gly Asn Gly Asn Leu
 100 105 110
 Val Lys Asn Ala Trp Gln Gly Ser Tyr Tyr Leu Lys Ala Asp Gly Lys
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 Met Ala Gln Ser Glu Trp Ile Tyr Asp Ser Ser Tyr Gln Ala Trp Tyr
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 Tyr Tyr Leu Lys Ser Asn Gly Lys Met Ala Gln Gly Glu Trp Val Tyr
 165 170 175
 Asp Ser Ser Tyr Gln Ala Trp Tyr Tyr Leu Lys Ser Asp Gly Ser Tyr
 180 185 190
 Ala Arg Asn Ala Trp Gln Gly Asn Tyr Tyr Leu Lys Ser Asp Gly Lys
 195 200 205
 Met Ala Lys Gly Glu Trp Val Tyr Asp Ala Thr Tyr Gln Ala Trp Tyr
 210 215 220
 Tyr Leu Thr Ser Asp Gly Ser Tyr Ala Tyr Ser Thr Trp Gln Gly Asn
 225 230 235 240
 Tyr Tyr Leu Lys Ser Asp Gly Lys Met Ala Val Asn Glu Trp Val Asp
 245 250 255
 Gly Gly Arg Tyr Tyr Val Gly Ala Asp Gly Val Trp Lys Glu Val Gln
 260 265 270
 Ala Ser Thr Ala Ser Ser Ser Asn Asp Ser Asn Ser Glu Tyr Ser Ala
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 Ala Leu Gly Lys Ala Lys Ser Tyr Asn Ser Leu Phe His Met Ser Lys
 Page 217

290

295

Lys Arg Met Tyr Arg Gln Leu Thr Ser Asp Phe Asp Lys Phe Ser Asn
305 310 315 320

Asp Ala Ala Gln Tyr Ala Ile Asp His Leu Asp Asp
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<210> 181
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<212> PRT
<213> Streptococcus pneumoniae

<400> 181

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35 40 45

Ala Gln Ser Leu Leu Glu Glu Gly Ile Lys Val Ile Thr Gly Gly His
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Pro Leu Glu Leu Leu Asp Glu Glu Phe Ala Leu Met Val Lys Asn Pro
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Gly Ile Pro Tyr Asn Asn Pro Met Ile Glu Lys Ala Leu Ala Lys Gly
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Ile Pro Val Leu Thr Glu Val Glu Leu Ala Tyr Leu Ile Ser Glu Ala
100 105 110

Pro Ile Ile Gly Ile Thr Gly Ser Asn Gly Lys Thr Thr Thr Thr
115 120 125

Met Ile Gly Glu Val Leu Thr Ala Ala Gly Gln His Gly Leu Leu Ser
130 135 140

Gly Asn Ile Gly Tyr Pro Ala Ser Gln Val Ala Gln Ile Ala Ser Asp
145 150 155 160

Lys Asp Thr Leu Val Met Glu Leu Ser Ser Phe Gln Leu Met Gly Val
165 170 175

Gln Glu Phe His Pro Glu Ile Ala Val Ile Thr Asn Leu Met Pro Thr
218

180

185

190

His Ile Asp Tyr His Gly Ser Phe Ser Glu Tyr Val Ala Ala Lys Trp
 195 200 205
 Asn Ile Gln Asn Lys Met Thr Ala Ala Asp Phe Leu Val Leu Asn Phe
 210 215 220
 Asn Gln Asp Leu Ala Lys Asp Leu Thr Ser Lys Thr Glu Ala Thr Val
 225 230 235 240
 Val Pro Phe Ser Thr Leu Glu Lys Val Asp Gly Ala Tyr Leu Glu Asp
 245 250 255
 Gly Gln Leu Tyr Phe Arg Gly Glu Val Val Met Ala Ala Asn Glu Ile
 260 265 270
 Gly Val Pro Gly Ser His Asn Val Glu Asn Ala Leu Ala Thr Ile Ala
 275 280 285
 Val Ala Lys Leu Arg Asp Val Asp Asn Gln Thr Ile Lys Glu Thr Leu
 290 295 300
 Ser Ala Phe Gly Gly Val Lys His Arg Leu Gln Phe Val Asp Asp Ile
 305 310 315 320
 Lys Gly Val Lys Phe Tyr Asn Asp Ser Lys Ser Thr Asn Ile Leu Ala
 325 330 335
 Thr Gln Lys Ala Leu Ser Gly Phe Asp Asn Ser Lys Val Val Leu Ile
 340 345 350
 Ala Gly Gly Leu Asp Arg Gly Asn Glu Phe Asp Glu Leu Val Pro Asp
 355 360 365
 Ile Thr Gly Leu Lys Lys Met Val Ile Leu Gly Gln Ser Ala Glu Arg
 370 375 380
 Val Lys Arg Ala Ala Asp Lys Ala Gly Val Ala Tyr Val Glu Ala Thr
 385 390 395 400
 Asp Ile Ala Asp Ala Thr Arg Lys Ala Tyr Glu Leu Ala Thr Gln Gly
 405 410 415
 Asp Val Val Leu Leu Ser Pro Ala Asn Ala Ser Trp Asp Met Tyr Ala
 420 425 430

Asn Phe Glu Val Arg Gly Asp Leu Phe Ile Asp Thr Val Ala Glu Leu
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Lys Glu
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 <212> PRT
 <213> Streptococcus pneumoniae

<400> 182

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 50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys
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Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala
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Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val
 100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala
 115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly
 130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser
 145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala
 165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly
 180 185 190

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Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp
 195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys
 210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn
 225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys
 245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln
 260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser
 275 280 285

Thr Thr Val Glu Val Ser Ala Lys Ala Lys Ala Phe Leu Asp Ala Tyr
 290 295 300

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr
 305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser
 325 330 335

Gly Glu Ile Lys Asn Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val
 340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala
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Lys Pro
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<210> 183

<211> 513

<212> PRT

<213> Streptococcus pneumoniae

<400> 183

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 50 55 60
 Tyr Val Thr Ala Gly Tyr Leu Asp Gln His Ser Val Leu Ala Glu Arg
 65 70 75 80
 Gln Ser Val Arg Asp Val Leu Arg Thr Ala Phe Asp Glu Leu Phe Lys
 85 90 95
 Ala Glu Ala Arg Ile Asn Asp Leu Tyr Met Lys Met Ala Glu Asp Gly
 100 105 110
 Ala Asp Val Asp Ala Leu Met Glu Glu Val Gly Glu Leu Gln Asp Arg
 115 120 125
 Leu Glu Ser Arg Asp Phe Tyr Thr Leu Asp Ala Lys Ile Asp Glu Val
 130 135 140
 Ala Arg Ala Leu Gly Val Met Asp Phe Gly Met Asp Thr Asp Val Thr
 145 150 155 160
 Ser Leu Ser Gly Gly Gln Arg Thr Lys Val Leu Leu Ala Lys Leu Leu
 165 170 175
 Leu Glu Lys Pro Asp Ile Leu Leu Leu Asp Glu Pro Thr Asn Tyr Leu Leu
 180 185 190
 Asp Ala Glu His Ile Asp Trp Leu Lys Arg Tyr Leu Gln Asn Tyr Glu
 195 200 205
 Asn Ala Phe Val Leu Ile Ser His Asp Ile Pro Phe Leu Asn Asp Val
 210 215 220
 Ile Asn Ile Val Tyr His Val Glu Asn Gln Gln Leu Thr Arg Tyr Ser
 225 230 235 240
 Gly Asp Tyr Tyr Gln Phe Gln Glu Val Tyr Ala Met Lys Lys Ser Gln
 245 250 255
 Leu Glu Ala Ala Tyr Glu Arg Gln Gln Lys Glu Ile Ala Asp Leu Lys
 260 265 270

1028462_1.TXT

Asp Phe Val Ala Arg Asn Lys Ala Arg Val Ala Thr Arg Asn Met Ala
 275 280 285
 Met Ser Arg Gln Lys Lys Leu Asp Lys Met Asp Ile Ile Glu Leu Gln
 290 295 300
 Ser Glu Lys Pro Lys Pro Ser Phe Asp Phe Lys Pro Ala Arg Thr Pro
 305 310 315 320
 Gly Arg Phe Ile Phe Gln Ala Lys Asn Leu Gln Ile Gly Tyr Asp Arg
 325 330 335
 Pro Leu Thr Lys Pro Leu Asn Leu Thr Phe Glu Arg Asn Gln Lys Val
 340 345 350
 Ala Ile Ile Gly Ala Asn Gly Ile Gly Lys Thr Thr Leu Leu Lys Ser
 355 360 365
 Leu Leu Gly Ile Ile Ser Pro Ile Ala Gly Glu Val Glu Arg Gly Asp
 370 375 380
 Tyr Leu Glu Leu Gly Tyr Phe Glu Gln Glu Val Glu Gly Gly Asn Arg
 385 390 395 400
 Gln Thr Pro Leu Glu Ala Val Trp Asn Ala Phe Pro Ala Leu Asn Gln
 405 410 415
 Ala Glu Val Arg Ala Ala Leu Ala Arg Cys Gly Leu Thr Thr Lys His
 420 425 430
 Ile Glu Ser Gln Ile Gln Val Leu Ser Gly Gly Glu Gln Ala Lys Val
 435 440 445
 Arg Phe Cys Leu Leu Met Asn Arg Glu Asn Asn Val Leu Val Leu Asp
 450 455 460
 Glu Pro Thr Asn His Leu Asp Val Asp Ala Lys Asp Glu Leu Lys Arg
 465 470 475 480
 Ala Leu Lys Glu Tyr Arg Gly Ser Ile Leu Met Val Cys His Glu Pro
 485 490 495
 Asp Phe Tyr Glu Gly Trp Ile Asp Gln Ile Trp Asp Phe Asn Asn Leu
 500 505 510

Thr

<210> 184
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 <213> Streptococcus pneumoniae

<400> 184

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 35 40 45

Val Val Ala Lys Glu Gly Ser Val Ala Ser Ser Val Leu Leu Ser Gly
 50 55 60

Thr Val Thr Ala Lys Asn Glu Gln Tyr Val Tyr Phe Asp Ala Ser Lys
 65 70 75 80

Gly Asp Leu Asp Glu Ile Leu Val Ser Val Gly Asp Lys Val Ser Glu
 85 90 95

Gly Gln Ala Leu Val Lys Tyr Ser Ser Ser Glu Ala Gln Ala Ala Tyr
 100 105 110

Asp Ser Ala Ser Arg Ala Val Ala Arg Ala Asp Arg His Ile Asn Glu
 115 120 125

Leu Asn Gln Ala Arg Asn Glu Ala Ala Ser Ala Pro Ala Pro Gln Leu
 130 135 140

Pro Ala Pro Val Gly Gly Glu Asp Ala Thr Val Gln Ser Pro Thr Pro
 145 150 155 160

Val Ala Gly Asn Ser Val Ala Ser Ile Asp Ala Gln Leu Gly Asp Ala
 165 170 175

Arg Asp Ala Arg Ala Asp Ala Ala Ala Gln Leu Ser Lys Ala Gln Ser
 180 185 190

Gln Leu Asp Ala Thr Thr Val Leu Ser Thr Leu Glu Gly Thr Val Val
 195 200 205

Glu Val Asn Ser Asn Val Ser Lys Ser Pro Thr Gly Ala Ser Gln Val
 210 215 220

1028462_1.TXT

Met Val His Ile Val Ser Asn Glu Asn Leu Gln Val Lys Gly Glu Leu
225 230 235 240

Ser Glu Tyr Asn Leu Ala Asn Leu Ser Val Gly Gln Glu Val Ser Phe
245 250 255

Thr Ser Lys Val Tyr Pro Asp Lys Lys Trp Thr Gly Lys Leu Ser Tyr
260 265 270

Ile Ser Asp Tyr Pro Lys Asn Asn Gly Glu Ala Ala Ser Pro Ala Ala
275 280 285

Gly Asn Asn Thr Gly Ser Lys Tyr Pro Tyr Thr Ile Asp Val Thr Gly
290 295 300

Glu Val Gly Asp Leu Lys Gln Gly Phe Ser Val Asn Ile Glu Val Lys
305 310 315 320

Ser Lys Thr Lys Ala Ile Leu Val Pro Val Ser Ser Leu Val Met Asp
325 330 335

Asp Ser Lys Asn Tyr Val Trp Ile Val Asp Glu Gln Gln Lys Ala Lys
340 345 350

Lys Val Glu Val Ser Leu Gly Asn Ala Asp Ala Glu Asn Gln Glu Ile
355 360 365

Thr Ser Gly Leu Thr Asn Gly Ala Lys Val Ile Ser Asn Pro Thr Ser
370 375 380

Ser Leu Glu Glu Gly Lys Glu Val Lys Ala Asp Glu Ala Thr Asn
385 390 395

<210> 185
<211> 230
<212> PRT
<213> Streptococcus pneumoniae

<400> 185

Ser Glu Thr Asn His Glu Ile Asp Ser Asn Phe Ala Gly Arg Leu Asn
1 5 10 15

Ile Leu Arg Ala Gly Val Leu Asp Ala Asn Asp Gly Ile Ile Ser Ile
20 25 30

Ala Gly Val Val Ile Gly Val Ala Ser Ala Thr Thr Asn Ile Trp Ile
35 40 45

1028462_1.TXT

Ile Phe Leu Ser Gly Phe Thr Ala Ile Leu Ala Gly Ala Phe Ser Met
50 55 60

Ala Gly Gly Glu Tyr Val Ser Val Ser Thr Pro Lys Asp Thr Glu Glu
65 70 75 80

Ala Ala Val Ser Arg Glu Lys Leu Leu Leu Asp Gln Asp Arg Glu Leu
85 90 95

Ala Lys Lys Ser Leu Tyr Ala Ala Tyr Ile Gln Asn Gly Glu Phe Lys
100 105 110

Thr Ser Ala Gln Leu Leu Thr Asn Lys Ile Phe Leu Lys Asn Pro Leu
115 120 125

Lys Ala Leu Val Glu Glu Lys Tyr Gly Ile Glu Tyr Glu Glu Phe Thr
130 135 140

Asn Pro Trp His Ala Ala Ile Ser Ser Phe Val Ala Phe Phe Leu Arg
145 150 155 160

Ser Leu Pro Pro Met Leu Ser Val Thr Ile Phe Pro Ser Asp Tyr Arg
165 170 175

Ile Pro Ala Thr Val Leu Ile Val Gly Val Ala Leu Leu Leu Thr Gly
180 185 190

Tyr Thr Ser Ala Arg Leu Gly Lys Ala Pro Thr Lys Thr Ala Met Ile
195 200 205

Arg Asn Leu Ala Ile Gly Leu Leu Thr Met Gly Val Thr Phe Leu Leu
210 215 220

Gly Gln Leu Phe Ser Ile
225 230

<210> 186
<211> 627
<212> PRT
<213> Streptococcus pneumoniae

<400> 186

Met Lys Lys Lys Leu Thr Ser Leu Ala Leu Val Gly Ala Phe Leu Gly
1 5 10 15

Leu Ser Trp Tyr Gly Asn Val Gln Ala Gln Glu Ser Ser Gly Asn Lys
20 25 30

1028462_1.TXT

Ile His Phe Ile Asn Val Gln Glu Gly Gly Ser Asp Ala Ile Ile Leu
 35 40 45
 Glu Ser Asn Gly His Phe Ala Met Val Asp Thr Gly Glu Asp Tyr Asp
 50 55 60
 Phe Pro Asp Gly Ser Asp Ser Arg Tyr Pro Trp Arg Glu Gly Ile Glu
 65 70 75 80
 Thr Ser Tyr Lys His Val Leu Thr Asp Arg Val Phe Arg Arg Leu Lys
 85 90 95
 Glu Leu Gly Val Gln Lys Leu Asp Phe Ile Leu Val Thr His Thr His
 100 105 110
 Ser Asp His Ile Gly Asn Val Asp Glu Leu Leu Ser Thr Tyr Pro Val
 115 120 125
 Asp Arg Val Tyr Leu Lys Lys Tyr Ser Asp Ser Arg Ile Thr Asn Ser
 130 135 140
 Glu Arg Leu Trp Asp Asn Leu Tyr Gly Tyr Asp Lys Val Leu Gln Thr
 145 150 155 160
 Ala Ala Glu Lys Gly Val Ser Val Ile Gln Asn Ile Thr Gln Gly Asp
 165 170 175
 Ala His Phe Gln Phe Gly Asp Met Asp Ile Gln Leu Tyr Asn Tyr Glu
 180 185 190
 Asn Glu Thr Asp Ser Ser Gly Glu Leu Lys Lys Ile Trp Asp Asp Asn
 195 200 205
 Ser Asn Ser Leu Ile Ser Val Val Lys Val Asn Gly Lys Lys Ile Tyr
 210 215 220
 Leu Gly Gly Asp Leu Asp Asn Val His Gly Ala Glu Asp Lys Tyr Gly
 225 230 235 240
 Pro Leu Ile Gly Lys Val Asp Leu Met Lys Phe Asn His His His Asp
 245 250 255
 Thr Asn Lys Ser Asn Thr Lys Asp Phe Ile Lys Asn Leu Ser Pro Ser
 260 265 270
 Leu Ile Val Gln Thr Ser Asp Ser Leu Pro Trp Lys Asn Gly Val Asp
 277

275

280

285

Ser Glu Tyr Val Asn Trp Leu Lys Glu Arg Gly Ile Glu Arg Ile Asn
 290 295 300
 Ala Ala Ser Lys Asp Tyr Asp Ala Thr Val Phe Asp Ile Arg Lys Asp
 305 310 315 320
 Gly Phe Val Asn Ile Ser Thr Ser Tyr Lys Pro Ile Pro Ser Phe Gln
 325 330 335
 Ala Gly Trp His Lys Ser Ala Tyr Gly Asn Trp Trp Tyr Gln Ala Pro
 340 345 350
 Asp Ser Thr Glu Tyr Ala Val Gly Trp Asn Glu Ile Glu Gly Glu
 355 360 365
 Trp Tyr Tyr Phe Asn Gln Thr Gly Ile Leu Leu Gln Asn Gln Trp Lys
 370 375 380
 Lys Trp Asn Asn His Trp Phe Tyr Leu Thr Asp Ser Gly Ala Ser Ala
 385 390 395 400
 Lys Asn Trp Lys Lys Ile Ala Gly Ile Trp Tyr Tyr Phe Asn Lys Glu
 405 410 415
 Asn Gln Met Glu Ile Gly Trp Ile Gln Asp Lys Glu Gln Trp Tyr Tyr
 420 425 430
 Leu Asp Val Asp Gly Ser Met Lys Thr Gly Trp Leu Gln Tyr Met Gly
 435 440 445
 Gln Trp Tyr Tyr Phe Ala Pro Ser Gly Glu Met Lys Met Gly Trp Val
 450 455 460
 Lys Asp Lys Glu Thr Trp Tyr Tyr Met Asp Ser Thr Gly Val Met Lys
 465 470 475 480
 Thr Gly Glu Ile Glu Val Ala Gly Gln His Tyr Tyr Leu Glu Asp Ser
 485 490 495
 Gly Ala Met Lys Gln Gly Trp His Lys Lys Ala Asn Asp Trp Tyr Phe
 500 505 510
 Tyr Lys Thr Asp Gly Ser Arg Ala Val Gly Trp Ile Lys Asp Lys Asp
 515 520 525

1028462_1.TXT

Lys Trp Tyr Phe Leu Lys Glu Asn Gly Gln Leu Leu Val Asn Gly Lys
 530 535 540

Thr Pro Glu Gly Tyr Thr Val Asp Ser Ser Gly Ala Trp Leu Val Asp
 545 550 555 560

Val Ser Ile Glu Lys Ser Ala Thr Ile Lys Thr Thr Ser His Ser Glu
 565 570 575

Ile Lys Glu Ser Lys Glu Val Val Lys Lys Asp Leu Glu Asn Lys Glu
 580 585 590

Thr Ser Gln His Glu Ser Val Thr Asn Phe Ser Thr Ser Gln Asp Leu
 595 600 605

Thr Ser Ser Thr Ser Gln Ser Ser Glu Thr Ser Val Asn Lys Ser Glu
 610 615 620

Ser Glu Gln
 625

<210> 187

<211> 456

<212> PRT

<213> Streptococcus pneumoniae

<400> 187

Met Asp Leu Gly Pro Thr Gln Arg Gly Ile Ser Val Val Ser Gln Ser
 1 5 10 15

Tyr Ile Asn Val Ile Gly Ala Gly Leu Ala Gly Ser Glu Ala Ala Tyr
 20 25 30

Gln Ile Ala Glu Arg Gly Ile Pro Val Lys Leu Tyr Glu Met Arg Gly
 35 40 45

Val Lys Ser Thr Pro Gln His Lys Thr Asp Asn Phe Ala Glu Leu Val
 50 55 60

Cys Ser Asn Ser Leu Arg Gly Asp Ala Leu Thr Asn Ala Val Gly Leu
 65 70 75 80

Leu Lys Glu Glu Met Arg Arg Leu Gly Ser Val Ile Leu Glu Ser Ala
 85 90 95

Glu Ala Thr Arg Val Pro Ala Gly Gly Ala Leu Ala Val Asp Arg Asp
 100 105 110

1028462_1.TXT

Gly Phe Ser Gln Met Val Thr Glu Lys Val Ala Asn His Pro Leu Ile
 115 120 125
 Glu Val Val Arg Asp Glu Ile Thr Glu Leu Pro Thr Asp Val Ile Thr
 130 135 140
 Val Ile Ala Thr Gly Pro Leu Thr Ser Asp Ala Leu Ala Glu Lys Ile
 145 150 155 160
 His Ala Leu Asn Asp Gly Ala Gly Phe Tyr Phe Tyr Asp Ala Ala Ala
 165 170 175
 Pro Ile Ile Asp Val Asn Thr Ile Asp Met Ser Lys Val Tyr Leu Lys
 180 185 190
 Ser Arg Tyr Asp Lys Gly Glu Ala Ala Tyr Leu Asn Ala Pro Met Thr
 195 200 205
 Lys Gln Glu Phe Met Asp Phe His Glu Ala Leu Val Asn Ala Glu Glu
 210 215 220
 Ala Pro Leu Ser Ser Phe Glu Lys Glu Lys Tyr Phe Glu Gly Cys Met
 225 230 235 240
 Pro Ile Glu Val Met Ala Lys Arg Gly Ile Lys Thr Met Leu Tyr Gly
 245 250 255
 Pro Met Lys Pro Val Gly Leu Glu Tyr Pro Asp Asp Tyr Thr Gly Pro
 260 265 270
 Arg Asp Gly Glu Phe Lys Thr Pro Tyr Ala Val Val Gln Leu Arg Gln
 275 280 285
 Asp Asn Ala Ala Gly Ser Leu Tyr Asn Ile Val Gly Phe Gln Thr His
 290 295 300
 Leu Lys Trp Gly Glu Gln Lys Arg Val Phe Gln Met Ile Pro Gly Leu
 305 310 315 320
 Glu Asn Ala Glu Phe Val Arg Tyr Gly Val Met His Arg Asn Ser Tyr
 325 330 335
 Met Asp Ser Pro Asn Leu Leu Glu Gln Thr Tyr Arg Ser Lys Lys Gln
 340 345 350
 Pro Asn Leu Phe Phe Ala Gly Gln Met Thr Gly Val Glu Gly Tyr Val
 355 360 365

1028462_1.TXT

Glu Ser Ala Ala Ser Gly Leu Val Ala Gly Ile Asn Ala Ala Arg Leu
 370 375 380

Phe Lys Glu Glu Ser Glu Ala Ile Phe Pro Glu Thr Thr Ala Ile Gly
 385 390 395 400

Ser Leu Ala His Tyr Ile Thr His Ala Asp Ser Lys His Phe Gln Pro
 405 410 415

Met Asn Val Asn Phe Gly Ile Ile Lys Glu Leu Glu Gly Glu Arg Ile
 420 425 430

Arg Asp Lys Lys Ala Arg Tyr Glu Lys Ile Ala Glu Arg Ala Leu Ala
 435 440 445

Asp Leu Glu Glu Phe Leu Thr Val
 450 455

<210> 188

<211> 360

<212> PRT

<213> Streptococcus pneumoniae

<400> 188

Met Leu Ile Gly Ile Pro Lys Glu Ile Lys Asn Asn Glu Asn Arg Val
 1 5 10 15

Ala Leu Thr Pro Ala Gly Val His Ser Leu Val Ser Arg Gly His Arg
 20 25 30

Val Leu Ile Glu Thr Asn Ala Gly Leu Gly Ser Gly Phe Thr Asp Ala
 35 40 45

Asp Tyr Gln Lys Gln Gly Ala Glu Ile Val Ala Thr Ala Gly Glu Ala
 50 55 60

Trp Ala Ala Glu Leu Val Val Lys Val Lys Glu Ser Leu Ser Ser Glu
 65 70 75 80

Tyr Gly Tyr Leu Arg Asp Asp Leu Leu Phe Thr Tyr Leu His Met
 85 90 95

Ala Ala Ala Pro Glu Leu Ala Asp Ala Met Leu Thr Ala Lys Thr Thr
 100 105 110

Glu Thr Val Arg Asp Asn Gln Gly Gln Leu Pro Leu Leu Val Pro Met
 115 120 125

1028462_1.TXT

Ser Glu Val Ala Gly Arg Met Ala Val Gln Ile Gly Ala His Phe Leu
 130 135 140
 Thr Lys Gln Ala Gly Gly Ser Gly Val Leu Leu Gly Gly Val Pro Gly
 145 150 155 160
 Val Pro Lys Gly Lys Val Thr Ile Ile Gly Gly Gly Val Val Gly Thr
 165 170 175
 His Ala Ala Arg Ile Ala Leu Gly Leu Gly Ala Gln Val Thr Ile Leu
 180 185 190
 Asp Ile Ser Ser Lys Arg Leu Ser Val Leu Glu Glu Val Phe Gly Ser
 195 200 205
 Gln Ile Gln Thr Leu Met Ser Asn Ser Phe Asn Ile Glu Ala Ser Val
 210 215 220
 Arg Asp Ala Asp Val Val Ile Gly Ala Ile Leu Ile Pro Gly Ala Lys
 225 230 235 240
 Ala Pro Glu Leu Val Thr Asp Glu Met Val Lys Gln Met Arg Pro Gly
 245 250 255
 Ser Val Ser Leu Thr Leu Leu Leu Thr Lys Val Ala Leu Ser Lys Gln
 260 265 270
 Leu Thr Val Gln Arg Thr Met Asn Pro Ser Met Lys Asn Thr Val Phe
 275 280 285
 Ser Thr Met Pro Leu Pro Ile Ser Leu Val Arg Leu Leu Ala Leu Gln
 290 295 300
 Pro Ser Pro Pro Met Ser Leu Phe Leu Ile Ser Lys Leu Trp Leu Ala
 305 310 315 320
 Lys Asp Ser His Lys Gln Ser Leu Lys Met Lys Ala Cys Val Lys Val
 325 330 335
 Leu Leu Ile Lys Val Thr Leu Thr Tyr Gln Leu Leu Lys Asp Leu Ile
 340 345 350
 Val Thr Thr Leu Ile Ser Met Ile
 355 360

<210> 189

<211> 839

<212> PRT

<213> Streptococcus pneumoniae

<400> 189

Met Lys Ile Asn Lys Lys Tyr Leu Ala Gly Ser Val Ala Val Leu Ala
1 5 10 15Leu Ser Val Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Val
20 25 30Lys Lys Glu Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly
35 40 45Gln Lys Ala Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly
50 55 60Ile Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val
65 70 75 80Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr
85 90 95Asp Ala Ile Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln
100 105 110Leu Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile
115 120 125Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala
130 135 140Asp Asn Ile Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His
145 150 155 160Ser His Asn His Gly Gly Gly Ser Asn Asp Gln Ala Val Val Ala Ala
165 170 175Arg Ala Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala
180 185 190Ser Asp Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly
195 200 205Asp His Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu
210 215 220Ala Ala Ala Glu Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser
225 230 235 240

1028462_1.TXT

Ser Ser Ser Ser Tyr Asn Ala Asn Pro Ala Gln Pro Arg Leu Ser Glu
 245 250 255
 Asn His Asn Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu
 260 265 270
 Asn Ile Ser Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu
 275 280 285
 Arg His Val Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr
 290 295 300
 Ser Arg Thr Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His
 305 310 315 320
 Phe Ile Pro Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg
 325 330 335
 Ile Ile Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg
 340 345 350
 Pro Glu Gln Pro Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Pro
 355 360 365
 Gln Pro Ala Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu
 370 375 380
 Lys Leu Val Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe
 385 390 395 400
 Glu Glu Asn Gly Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala
 405 410 415
 Glu Thr Ala Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu
 420 425 430
 Ser His Lys Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg
 435 440 445
 Glu Phe Tyr Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp
 450 455 460
 Leu Leu Asp Asn Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn
 465 470 475 480
 Leu Leu Glu Arg Leu Lys Asp Val Pro Ser Asp Lys Val Lys Leu Val
 Page 234

Asp Asp Ile Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu
500 505 510

Gly Lys Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val
515 520 525

Ala Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp
530 535 540

Pro Arg Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His
545 550 555 560

Met Thr His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu
565 570 575

Arg Ala Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro
580 585 590

Ser Thr Asp His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu
595 600 605

Ala Ile Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg
610 615 620

Met Pro Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu
625 630 635 640

Ile Ile Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe
645 650 655

Asp Glu Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu
660 665 670

Leu Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His
675 680 685

Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys
690 695 700

Val Asp Gln Asp Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val
705 710 715 720

Ser Glu Pro Thr His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly
725 730 735

1028462_1.TXT

Leu Asn Pro Ser Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu
 740 745 750

Glu Thr Glu Glu Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro
 755 760 765

Gln Val Glu Asn Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala
 770 775 780

Leu Leu Glu Lys Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu
 785 790 795 800

Thr Leu Thr Gly Leu Lys Ser Ser Leu Leu Leu Gly Thr Lys Asp Asn
 805 810 815

Asn Thr Ile Ser Ala Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu
 820 825 830

Ser Gln Pro Ala Pro Ile Gln
 835

<210> 190
 <211> 1039
 <212> PRT
 <213> Streptococcus pneumoniae
 <400> 190

Met Lys Phe Ser Lys Lys Tyr Ile Ala Ala Gly Ser Ala Val Ile Val
 1 5 10 15

Ser Leu Ser Leu Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu
 20 25 30

Asn Lys Asp Asn Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser
 35 40 45

Gln Lys Ser Glu Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly
 50 55 60

Ile Gln Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val
 65 70 75 80

Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr
 85 90 95

Asp Ala Leu Phe Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln
 100 105 110

1028462_1.TXT

Leu Lys Asp Ala Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile
 115 120 125
 Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala
 130 135 140
 Asp Asn Val Arg Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His
 145 150 155 160
 Val Lys Asp Asn Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser
 165 170 175
 Gln Gly Arg Tyr Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp
 180 185 190
 Ile Ile Glu Asp Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His
 195 200 205
 Tyr His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala
 210 215 220
 Ala Lys Ala His Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser
 225 230 235 240
 Tyr Ser Ser Thr Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly
 245 250 255
 Ser Thr Ser Lys Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu
 260 265 270
 Lys Glu Leu Tyr Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp
 275 280 285
 Gly Leu Val Phe Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly
 290 295 300
 Val Ala Ile Pro His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys
 305 310 315 320
 Leu Ser Ala Leu Glu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly
 325 330 335
 Thr Gly Ser Thr Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser
 340 345 350
 Ser Leu Gly Ser Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys
 355 360 365

1028462_1.TXT

Glu Leu Ser Ser Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile
 370 375
 Val Glu Glu Thr Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe
 385 390 395 400
 His Tyr Ile Pro Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn
 405 410 415
 Asn Ser Leu Ala Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr
 420 425 430
 Ser His Glu Lys His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg
 435 440 445
 Ile Ile Ala Glu Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His
 450 455 460
 Asn His Tyr Phe Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala
 465 470 475 480
 Ala Gln Lys His Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp
 485 490 495
 Ser Leu Ser Ser His Glu Gln Asp Tyr Pro Ser Asn Ala Lys Glu Met
 500 505 510
 Lys Asp Leu Asp Lys Lys Ile Glu Glu Lys Ile Ala Gly Ile Met Lys
 515 520 525
 Gln Tyr Gly Val Lys Arg Glu Ser Ile Val Val Asn Lys Glu Lys Asn
 530 535 540
 Ala Ile Ile Tyr Pro His Gly Asp His His His Ala Asp Pro Ile Asp
 545 550 555 560
 Glu His Lys Pro Val Gly Ile Gly His Ser His Ser Asn Tyr Glu Leu
 565 570 575
 Phe Lys Pro Glu Glu Gly Val Ala Lys Lys Glu Gly Asn Lys Val Tyr
 580 585 590
 Thr Gly Glu Glu Leu Thr Asn Val Val Asn Leu Leu Lys Asn Ser Thr
 595 600 605
 Phe Asn Asn Gln Asn Phe Thr Leu Ala Asn Gly Gln Lys Arg Val Ser
 610 615 620

1028462_1.TXT

Phe Ser Phe Pro Pro Glu Leu Glu Lys Lys Leu Gly Ile Asn Met Leu
 625 630 635 640
 Val Lys Leu Ile Thr Pro Asp Gly Lys Val Leu Glu Lys Val Ser Gly
 645 650 655
 Lys Val Phe Gly Glu Gly Val Gly Asn Ile Ala Asn Phe Glu Leu Asp
 660 665 670
 Gln Pro Tyr Leu Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys
 675 680 685
 Asp Tyr Pro Glu Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser
 690 695 700
 Leu Ala Tyr Lys Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala
 705 710 715 720
 Gly Asp Thr Tyr Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly
 725 730 735
 Thr Asp Ala Leu Val Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr
 740 745 750
 Leu Glu Asn Asn Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys
 755 760 765
 Leu Asn Gln Gly Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr
 770 775 780
 Phe Met Ala Asn Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu
 785 790 795 800
 Val Pro Ile Leu Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu
 805 810 815
 Pro Gln Phe Lys Arg Asn Lys Ala Gln Glu Asn Leu Lys Leu Asp Glu
 820 825 830
 Lys Val Glu Glu Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu
 835 840 845
 Ser Glu Thr Gly Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro
 850 855 860
 Thr Val Asp Pro Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr

865 870 875 880
 Gly Met Lys Leu Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu
 885 890
 Leu Tyr Leu Pro Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe
 900 905
 Thr Gly Glu Ala Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn
 915 920 925
 Gly Lys Val Ser Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys
 930 935 940
 Pro Ala Asp Ser Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro
 945 950 955 960
 Glu Asn Ser Thr Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly
 965 970 975
 Ser Asp Pro Met Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp
 980 985 990
 Pro Val Gln Glu Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly
 995 1000 1005
 Leu Asp Ser Val Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg
 1010 1015 1020
 Leu Pro Ser Gly Glu Val Ile Lys Lys Asn Leu Ser Asp Leu Ile
 1025 1030 1035

Ala

<210> 191
 <211> 477
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 191

Met Lys Ile Leu Phe Val Ala Ala Glu Gly Ala Pro Phe Ser Lys Thr
 1 5 10 15
 Gly Gly Leu Gly Asp Val Ile Gly Ala Leu Pro Lys Ser Leu Val Lys
 20 25 30

Ala Gly His Glu Val Ala Val Ile Leu Pro Tyr Tyr Asp Met Val Glu

Ala Lys Phe Gly Asn Gln Ile Glu Asp Val Leu His Phe Glu Val Ser
 50 55 60
 Val Gly Trp Arg Arg Gln Tyr Cys Gly Ile Lys Lys Thr Val Leu Asn
 65 70 75 80
 Gly Val Thr Phe Tyr Phe Ile Asp Asn Gln Tyr Tyr Phe Phe Arg Gly
 85 90 95
 His Val Tyr Gly Asp Phe Asp Asp Gly Glu Arg Phe Ala Phe Phe Gln
 100 105 110
 Leu Ala Ala Ile Glu Ala Met Glu Arg Ile Asp Phe Ile Pro Asp Leu
 115 120 125
 Leu His Val His Asp Tyr His Thr Ala Met Ile Pro Phe Leu Leu Lys
 130 135 140
 Glu Lys Tyr Arg Trp Ile Gln Ala Tyr Glu Asp Ile Glu Thr Val Leu
 145 150 155 160
 Thr Ile His Asn Leu Glu Phe Gln Gly Gln Phe Ser Glu Gly Met Leu
 165 170 175
 Gly Asp Leu Phe Gly Val Gly Phe Glu Arg Tyr Ala Asp Gly Thr Leu
 180 185 190
 Arg Trp Asn Asn Cys Leu Asn Trp Met Lys Ala Gly Ile Leu Tyr Ala
 195 200 205
 Asn Arg Val Ser Thr Val Ser Pro Ser Tyr Ala His Glu Ile Met Thr
 210 215 220
 Ser Gln Phe Gly Cys Asn Leu Asp Gln Ile Leu Lys Met Glu Ser Gly
 225 230 235 240
 Lys Val Ser Gly Ile Val Asn Gly Ile Asp Ala Asp Leu Tyr Asn Pro
 245 250 255
 Gln Thr Asp Ala Leu Leu Asp Tyr His Phe Asn Gln Glu Asp Leu Ser
 260 265 270
 Gly Lys Ala Lys Asn Lys Ala Lys Leu Gln Glu Arg Val Gly Leu Pro
 275 280 285

1028462_1.TXT

Val Arg Ala Asp Val Pro Leu Val Gly Ile Val Ser Arg Leu Thr Arg
 290 295 300

Gln Lys Gly Phe Asp Val Val Val Glu Ser Leu His His Ile Leu Gln
 305 310 315 320

Glu Asp Val Gln Ile Val Leu Leu Gly Thr Gly Asp Pro Ala Phe Glu
 325 330 335

Gly Ala Phe Ser Trp Phe Ala Gln Ile Tyr Pro Asp Lys Leu Ser Thr
 340 345 350

Asn Ile Thr Phe Asp Val Lys Leu Ala Gln Glu Ile Tyr Ala Ala Cys
 355 360 365

Asp Leu Phe Leu Met Pro Ser Arg Phe Glu Pro Cys Gly Leu Ser Gln
 370 375 380

Met Met Ala Met Arg Tyr Gly Thr Leu Pro Leu Val His Glu Val Gly
 385 390 395 400

Gly Leu Arg Asp Thr Val Arg Ala Phe Asn Pro Ile Glu Gly Ser Gly
 405 410 415

Thr Gly Phe Ser Phe Asp Asn Leu Ser Pro Tyr Trp Leu Asn Trp Thr
 420 425 430

Phe Gln Thr Ala Leu Asp Leu Tyr Arg Asn His Pro Asp Ile Trp Arg
 435 440 445

Asn Leu Gln Lys Gln Ala Met Glu Ser Asp Phe Ser Trp Asp Thr Ala
 450 455 460

Cys Lys Ser Tyr Leu Asp Leu Tyr His Ser Leu Val Asn
 465 470 475

<210> 192

<211> 2004

<212> PRT

<213> Streptococcus pneumoniae

<400> 192

Met Glu Lys Tyr Phe Gly Glu Lys Gln Glu Arg Phe Ser Phe Arg Lys
 1 5 10 15

Leu Ser Val Gly Leu Val Ser Ala Thr Ile Ser Ser Leu Phe Phe Met
 20 25 30

1028462_1.TXT

Ser Val Leu Ala Ser Ser Ser Val Asp Ala Gln Glu Thr Ala Gly Val
 35 40 45
 His Tyr Lys Tyr Val Ala Asp Ser Glu Leu Ser Ser Glu Glu Lys Lys
 50 55 60
 Gln Leu Val Tyr Asp Ile Pro Thr Tyr Val Glu Asn Asp Asp Glu Thr
 65 70 75 80
 Tyr Tyr Leu Val Tyr Lys Leu Asn Ser Gln Asn Gln Leu Ala Glu Leu
 85 90 95
 Pro Asn Thr Gly Ser Lys Asn Glu Arg Gln Ala Leu Val Ala Gly Ala
 100 105 110
 Ser Leu Ala Ala Met Gly Ile Leu Ile Phe Ala Val Ser Lys Lys Lys
 115 120 125
 Val Lys Asn Lys Thr Val Leu His Leu Val Leu Val Ala Gly Ile Gly
 130 135 140
 Asn Gly Val Leu Val Ser Val His Ala Leu Glu Asn His Leu Leu Leu
 145 150 155 160
 Asn Tyr Asn Thr Asp Tyr Glu Leu Thr Ser Gly Glu Lys Leu Pro Leu
 165 170 175
 Pro Lys Glu Ile Ser Gly Tyr Thr Tyr Ile Gly Tyr Ile Lys Glu Gly
 180 185 190
 Lys Thr Thr Ser Glu Ser Glu Val Ser Asn Gln Lys Ser Ser Val Ala
 195 200 205
 Thr Pro Thr Lys Gln Gln Lys Val Asp Tyr Asn Val Thr Pro Asn Phe
 210 215 220
 Val Asp His Pro Ser Thr Val Gln Ala Ile Gln Glu Gln Thr Pro Val
 225 230 235 240
 Ser Ser Thr Lys Pro Thr Glu Val Gln Val Val Glu Lys Pro Phe Ser
 245 250 255
 Thr Glu Leu Ile Asn Pro Arg Lys Glu Glu Lys Gln Ser Ser Asp Ser
 260 265 270
 Gln Glu Gln Leu Ala Glu His Lys Asn Leu Glu Thr Lys Lys Glu Glu
 275 280 285

1028462_1.TXT

Lys Ile Ser Pro Lys Glu Lys Thr Gly Val Asn Thr Leu Asn Pro Gln
 290 295 300
 Asp Glu Val Leu Ser Gly Gln Leu Asn Lys Pro Glu Leu Leu Tyr Arg
 305 310 315 320
 Glu Glu Thr Met Glu Thr Lys Ile Asp Phe Gln Glu Glu Ile Gln Glu
 325 330 335
 Asn Pro Asp Leu Ala Glu Gly Thr Val Arg Val Lys Gln Glu Gly Lys
 340 345 350
 Leu Gly Lys Lys Val Glu Ile Val Arg Ile Phe Ser Val Asn Lys Glu
 355 360 365
 Glu Val Ser Arg Glu Ile Val Ser Thr Ser Thr Thr Ala Pro Ser Pro
 370 375 380
 Arg Ile Val Glu Lys Gly Thr Lys Lys Thr Gln Val Ile Lys Glu Gln
 385 390 395 400
 Pro Glu Thr Gly Val Glu His Lys Asp Val Gln Ser Gly Ala Ile Val
 405 410 415
 Glu Pro Ala Ile Gln Pro Glu Leu Pro Glu Ala Val Val Ser Asp Lys
 420 425 430
 Gly Glu Pro Glu Val Gln Pro Thr Leu Pro Glu Ala Val Val Thr Asp
 435 440 445
 Lys Gly Glu Thr Glu Val Gln Pro Glu Ser Pro Asp Thr Val Val Ser
 450 455 460
 Asp Lys Gly Glu Pro Glu Gln Val Ala Pro Leu Pro Glu Tyr Lys Gly
 465 470 475 480
 Asn Ile Glu Gln Val Lys Pro Glu Thr Pro Val Glu Lys Thr Lys Glu
 485 490 495
 Gln Gly Pro Glu Lys Thr Glu Glu Val Pro Val Lys Pro Thr Glu Glu
 500 505 510
 Thr Pro Val Asn Pro Asn Glu Gly Thr Thr Glu Gly Thr Ser Ile Gln
 515 520 525
 Glu Ala Glu Asn Pro Val Gln Pro Ala Glu Glu Ser Thr Thr Asn Ser
 530 535 540

1028462_1.TXT

Glu Lys Val Ser Pro Asp Thr Ser Ser Lys Asn Thr Gly Glu Val Ser
 545 550 555 560
 Ser Asn Pro Ser Asp Ser Thr Thr Ser Val Gly Glu Ser Asn Lys Pro
 565 570 575
 Glu His Asn Asp Ser Lys Asn Glu Asn Ser Glu Lys Thr Val Glu Glu
 580 585 590
 Val Pro Val Asn Pro Asn Glu Gly Thr Val Glu Gly Thr Ser Asn Gln
 595 600 605
 Glu Thr Glu Lys Pro Val Gln Pro Ala Glu Glu Thr Gln Thr Asn Ser
 610 615 620
 Gly Lys Ile Ala Asn Glu Asn Thr Gly Glu Val Ser Asn Lys Pro Ser
 625 630 635 640
 Asp Ser Lys Pro Pro Val Glu Glu Ser Asn Gln Pro Glu Lys Asn Gly
 645 650 655
 Thr Ala Thr Lys Pro Glu Asn Ser Gly Asn Thr Thr Ser Glu Asn Gly
 660 665 670
 Gln Thr Glu Pro Glu Pro Ser Asn Gly Asn Ser Thr Glu Asp Val Ser
 675 680 685
 Thr Glu Ser Asn Thr Ser Asn Ser Asn Gly Asn Glu Glu Ile Lys Gln
 690 695 700
 Glu Asn Glu Leu Asp Pro Asp Lys Lys Val Glu Glu Pro Glu Lys Thr
 705 710 715 720
 Leu Glu Leu Arg Asn Val Ser Asp Leu Glu Leu Tyr Ser Leu Ser Asn
 725 730 735
 Gly Thr Tyr Lys Gln His Ile Ser Leu Glu Gln Val Pro Ser Asn Pro
 740 745 750
 Asn Ser Tyr Phe Val Lys Val Lys Ser Ser Ser Phe Lys Asp Val Tyr
 755 760 765
 Leu Pro Val Ala Ser Ile Ser Glu Glu Arg Lys Asn Asp Lys Ile Leu
 770 775 780
 Tyr Lys Ile Thr Ala Lys Val Glu Lys Leu Gln Gln Glu Ile Glu Ser
 Page 245

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785                790                795                800
Arg Tyr Lys Asp Asn Phe Thr Phe Tyr Leu Ala Lys Lys Gly Thr Glu
      805      810
Glu Thr Thr Asn Phe Thr Ser Phe Ser Asn Leu Val Lys Ala Ile Asn
      820      825      830
Gln Asn Pro Ser Gly Thr Tyr His Leu Ala Ala Ser Leu Asn Ala Asn
      835      840      845
Glu Val Glu Leu Gly Pro Asp Glu Arg Ser Tyr Ile Lys Asp Thr Phe
      850      855      860
Thr Gly Arg Leu Ile Gly Glu Lys Asp Gly Lys Asn Tyr Ala Ile Tyr
      865      870      875      880
Asn Leu Lys Lys Pro Leu Phe Glu Asn Leu Ser Gly Ala Thr Val Glu
      885      890      895
Lys Leu Ser Leu Lys Asn Val Ala Ile Ser Gly Lys Asp Asp Ile Gly
      900      905      910
Ser Leu Ala Asn Glu Ala Gln Asn Asn Thr Lys Ile Lys Gln Val His
      915      920      925
Val Asp Gly Val Leu Ala Gly Glu Arg Gly Ile Gly Gly Leu Leu Ala
      930      935      940
Lys Ala Glu Gln Ser Ser Ile Thr Glu Ser Ser Phe Lys Gly Arg Ile
      945      950      955      960
Ile Asn Thr Tyr Glu Thr Thr Ala Ala Tyr Asn Ile Gly Gly Met Val
      965      970      975
Gly His Leu Thr Gly Asp Lys Ala Leu Leu Thr Lys Ser Lys Ala Thr
      980      985      990
Val Ala Ile Ser Ser Asn Thr Asn Thr Ser Asp Gln Thr Val Gly Gly
      995      1000      1005
Leu Ala Gly Leu Val Asp Arg Asp Ala Gln Ile Gln Asp Ser Tyr
      1010      1015      1020
Ala Glu Gly Asp Ile Asn Asn Val Lys His Phe Gly Arg Val Ala
      1025      1030      1035

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1028462_1.TXT

Gly Val Ala Gly Asn Leu Trp Asp Arg Thr Ser Gly Asp Val Arg
 1040 1045 1050
 His Ala Gly Ser Leu Thr Asn Val Leu Ser Asp Val Asn Val Thr
 1055 1060 1065
 Asn Gly Asn Ala Ile Thr Gly Tyr His Tyr Asn Glu Met Lys Val
 1070 1075 1080
 Lys Asp Thr Phe Ser Ser Lys Ala Asn Arg Val Tyr Asn Val Thr
 1085 1090 1095
 Leu Val Lys Asp Glu Val Val Ser Lys Glu Ser Phe Glu Glu Arg
 1100 1105 1110
 Gly Thr Met Leu Asp Ala Ser Gln Ile Ala Ser Lys Lys Ala Glu
 1115 1120 1125
 Ile Asn Pro Leu Ile Leu Pro Thr Val Glu Pro Leu Ser Thr Ser
 1130 1135 1140
 Gly Lys Lys Asp Ser Asp Phe Ser Lys Val Ala Tyr Tyr Gln Ala
 1145 1150 1155
 Lys Arg Asn Leu Thr Tyr Lys Asn Ile Glu Lys Leu Leu Pro Phe
 1160 1165 1170
 Tyr Asn Lys Ala Thr Ile Val Lys Tyr Gly Asn Leu Val Asn Glu
 1175 1180 1185
 Asn Ser Leu Leu Tyr Gln Lys Glu Leu Leu Ser Ala Val Met Met
 1190 1195 1200
 Lys Asp Asn Gln Val Ile Thr Asp Ile Val Ser Asn Lys Gln Thr
 1205 1210 1215
 Ala Asn Lys Leu Leu Leu His Tyr Lys Asp Asp Leu Ser Glu Lys
 1220 1225 1230
 Leu Asp Leu Lys Tyr Gln Asn Asp Phe Ala Lys Leu Ala Glu Tyr
 1235 1240 1245
 Ser Leu Gly Asn Thr Gly Leu Leu Tyr Thr Pro Asn Gln Phe Leu
 1250 1255 1260
 Tyr Asp Gln Thr Ser Ile Ile Lys Gln Val Leu Pro Asp Leu Gln
 1265 1270 1275

1028462_1.TXT

Lys Val Asp Tyr His Ser Glu Ala Ile Arg Lys Thr Leu Gly Ile
 1280 1285 1290
 Ser Pro Asn Val Lys Gln Thr Glu Leu Tyr Leu Glu Asp Gln Phe
 1295 1300 1305
 Ala Lys Thr Lys Gln Gln Leu Glu Asp Ser Leu Lys Lys Leu Leu
 1310 1315 1320
 Ser Ala Asp Ala Gly Leu Ala Ser Ala Asn Pro Val Thr Glu Gly
 1325 1330 1335
 Tyr Leu Val Asp Lys Ile Lys Arg Asn Lys Glu Ala Leu Leu Leu
 1340 1345 1350
 Gly Leu Thr Tyr Leu Glu Arg Trp Tyr Asn Phe Ser Tyr Gly Gln
 1355 1360 1365
 Val Asn Val Lys Asp Leu Val Leu Tyr His Leu Asp Phe Phe Gly
 1370 1375 1380
 Lys Gly Asn Ala Ser Pro Leu Asp Thr Leu Ile Glu Leu Gly Lys
 1385 1390 1395
 Ser Gly Phe Asn Asn Leu Leu Ala Lys Asn Asn Val Asp Thr Tyr
 1400 1405 1410
 Gly Ile Ser Leu Ala Ser Gln His Gly Thr Thr Asp Leu Phe Ser
 1415 1420 1425
 Thr Leu Glu His Tyr Arg Lys Val Phe Leu Pro Asn Thr Ser Asn
 1430 1435 1440
 Asn Asp Trp Phe Lys Ser Glu Thr Lys Ala Tyr Ile Val Glu Glu
 1445 1450 1455
 Lys Ser Thr Ile Glu Glu Val Lys Thr Lys Gln Gly Leu Ala Gly
 1460 1465 1470
 Thr Lys Tyr Ser Ile Gly Val Tyr Asp Arg Ile Thr Ser Ala Thr
 1475 1480 1485
 Trp Lys Tyr Arg Asn Met Val Leu Pro Leu Leu Thr Leu Pro Glu
 1490 1495 1500
 Arg Ser Val Phe Val Ile Ser Thr Met Ser Ser Leu Gly Phe Gly
 1505 1510 1515

1028462_1.TXT

Ala Tyr Asp Arg Tyr Arg Ser Ser Asp His Lys Ala Gly Lys Ala
 1520 1525 1530
 Leu Asn Asp Phe Val Glu Glu Asn Ala Arg Glu Thr Ala Lys Arg
 1535 1540 1545
 Gln Arg Asp His Tyr Asp Tyr Trp Tyr Arg Ile Leu Asp Asp Asn
 1550 1555 1560
 Ala Arg Glu Lys Leu Tyr Arg Asn Ile Leu Leu Tyr Asp Ala Tyr
 1565 1570 1575
 Lys Phe Gly Asp Asp Asn Thr Val Gly Lys Ala Thr Glu Val Ala
 1580 1585 1590
 Asp Phe Asp Asn Pro Asn Pro Ala Met Gln His Phe Phe Gly Pro
 1595 1600 1605
 Val Gly Asn Lys Val Gly His Asn Gln His Gly Ala Tyr Ala Thr
 1610 1615 1620
 Gly Asp Ala Val Tyr Tyr Met Gly Tyr Arg Met Leu Asp Lys Asp
 1625 1630 1635
 Gly Ala Ile Thr Tyr Thr His Glu Met Thr His Asp Ser Asp Gln
 1640 1645 1650
 Asp Ile Tyr Leu Gly Gly Tyr Gly Arg Arg Ser Gly Leu Gly Pro
 1655 1660 1665
 Glu Phe Phe Ala Lys Gly Leu Leu Gln Ala Pro Asp His Pro Asp
 1670 1675 1680
 Asp Ala Thr Ile Thr Ile Asn Ser Ile Leu Lys His Ser Lys Ser
 1685 1690 1695
 Asp Ser Thr Glu Ser Arg Arg Leu Gln Val Leu Asp Pro Thr Thr
 1700 1705 1710
 Arg Phe Asn Asn Ala Asp Asp Leu Lys Gln Tyr Val His Asn Met
 1715 1720 1725
 Phe Asp Val Val Tyr Met Leu Glu Tyr Leu Glu Gly Asn Ser Ile
 1730 1735 1740
 Leu Lys Leu Asp Thr Asn Gln Lys Gln Gln Leu Leu Arg Lys Val
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1745

1750

Thr	Asn	Glu	Tyr	His	Pro	Asp	Pro	Asp	Gly	Asn	Lys	Val	Tyr	Ala
	1760					1765					1770			
Thr	Asn	Val	Val	Arg	Asn	Leu	Thr	Val	Glu	Glu	Val	Glu	Arg	Leu
	1775					1780					1785			
Arg	Ser	Phe	Asn	Asp	Leu	Ile	Asp	Asn	Asn	Ile	Leu	Ser	Ser	Arg
	1790					1795					1800			
Glu	Tyr	Ala	Ser	Gly	Lys	Tyr	Glu	Arg	Asn	Gly	Tyr	Phe	Thr	Ile
	1805					1810					1815			
Lys	Leu	Phe	Ala	Pro	Ile	Tyr	Ala	Ala	Leu	Ser	Asn	Asp	Ile	Gly
	1820					1825					1830			
Thr	Pro	Gly	Asp	Leu	Met	Gly	Arg	Arg	Ile	Ala	Tyr	Glu	Leu	Leu
	1835					1840					1845			
Ala	Ala	Lys	Gly	Phe	Lys	Asp	Gly	Met	Val	Pro	Tyr	Ile	Ser	Asn
	1850					1855					1860			
Gln	Tyr	Glu	Glu	Glu	Ala	Lys	Gln	Lys	Gly	Lys	Thr	Ile	Asn	Leu
	1865					1870					1875			
Tyr	Gly	Lys	Thr	Arg	Gly	Leu	Val	Thr	Asp	Asp	Leu	Val	Leu	Glu
	1880					1885					1890			
Lys	Val	Phe	Asn	Asn	Gln	Tyr	His	Thr	Trp	Ser	Glu	Phe	Lys	Lys
	1895					1900					1905			
Ala	Met	Tyr	Gln	Glu	Arg	Gln	Asp	Gln	Phe	Asp	Arg	Leu	Asn	Lys
	1910					1915					1920			
Val	Thr	Phe	Asn	Asp	Thr	Thr	Gln	Pro	Trp	Gln	Thr	Phe	Ala	Lys
	1925					1930					1935			
Lys	Thr	Thr	Ser	Ser	Val	Asp	Glu	Leu	Gln	Lys	Leu	Met	Asp	Val
	1940					1945					1950			
Ala	Val	Arg	Lys	Asp	Ala	Glu	His	Asn	Tyr	Tyr	His	Trp	Asn	Asn
	1955					1960					1965			
Tyr	Asn	Pro	Asp	Ile	Asp	Ser	Glu	Val	His	Lys	Leu	Lys	Arg	Ala
	1970					1975					1980			

1028462_1.TXT

Ile Phe Lys Ala Tyr Leu Asp Gln Thr Asn Asp Phe Arg Ser Ser
 1985 1990 1995

Ile Phe Glu Asn Lys Lys
 2000

<210> 193
 <211> 819
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 193

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Leu Ser Val Cys Ser Tyr Glu Leu Gly Arg Tyr Gln Ala Gly Gln Asp
 20 25 30

Lys Lys Glu Ser Asn Arg Val Ala Tyr Ile Asp Gly Asp Gln Ala Gly
 35 40 45

Gln Lys Ala Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly
 50 55 60

Ile Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val
 65 70 75 80

Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr
 85 90 95

Asp Ala Ile Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln
 100 105 110

Leu Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile
 115 120 125

Lys Val Asn Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala
 130 135 140

Asp Asn Ile Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu Arg
 145 150 155 160

Ser His Asn His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg
 165 170 175

Ala Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser
 180 185 190

1028462_1.TXT

Asp Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp
 195 200 205
 His Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala
 210 215 220
 Ala Ala Glu Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser
 225 230 235 240
 Ser Ser Ser Tyr Asn Ala Asn Pro Ala Gln Pro Arg Leu Ser Glu Asn
 245 250 255
 His Asn Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn
 260 265 270
 Ile Ser Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg
 275 280 285
 His Val Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser
 290 295 300
 Arg Thr Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe
 305 310 315 320
 Ile Pro Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile
 325 330 335
 Ile Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro
 340 345 350
 Glu Glu Pro Ser Pro Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro Gln
 355 360 365
 Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys Glu Ala Val
 370 375 380
 Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly Val Ser Arg
 385 390 395 400
 Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala Gly Ile Asp
 405 410 415
 Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu Gly Thr Lys
 420 425 430
 Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn Lys Ala Tyr
 435 440 445

1028462_1.TXT

Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly Arg
 450 455 460
 Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys Asp
 465 470 475
 Val Ser Ser Asp Lys Val Lys Leu Val Glu Asp Ile Leu Ala Phe Leu
 485 490 495
 Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ala Gln Ile
 500 505 510
 Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr
 515 520 525
 Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp
 530 535 540
 Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile
 545 550 555 560
 Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala Gln Ala Tyr
 565 570 575
 Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp Ser
 580 585 590
 Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys
 595 600 605
 Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr
 610 615 620
 Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His
 625 630 635 640
 Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala
 645 650 655
 Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr
 660 665 670
 Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn
 675 680 685
 Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr Asn
 690 695 700

1028462_1.TXT

Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu Lys Pro Glu
705 710 715 720

Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu Ser
725 730 735

Pro Lys Pro Thr Glu Glu Pro Glu Glu Ser Pro Glu Glu Ser Glu Glu
740 745 750

Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu Arg Glu Ala Glu
755 760 765

Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys Ser Asn Ala Lys
770 775 780

Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr Gln Asp
785 790 795 800

Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu Leu Ala Leu Leu Lys
805 810 815

Glu Ser Lys

<210> 194
<211> 802
<212> PRT
<213> Streptococcus pneumoniae
<400> 194

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Thr Val Lys Glu Asn Asn Arg Val Ser Tyr Ile Asp Gly Lys Gln Ala
20 25 30

Thr Gln Lys Thr Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu
35 40 45

Gly Ile Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr
50 55 60

Val Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro
65 70 75 80

Tyr Asp Ala Ile Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr
85 90 95

1028462_1.TXT

Lys Leu Lys Asp Glu Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Val
 100 105 110
 Ile Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His
 115 120 125
 Ala Asp Asn Val Arg Thr Lys Glu Glu Ile Asn Arg Gln Lys Gln Glu
 130 135 140
 His Ser Gln His Arg Glu Gly Gly Thr Pro Arg Asn Asp Gly Ala Val
 145 150 155 160
 Ala Leu Ala Arg Ser Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile
 165 170 175
 Phe Asn Ala Ser Asp Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val
 180 185 190
 Pro His Gly Asp His Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala
 195 200 205
 Ser Glu Leu Ala Ala Ala Glu Ala Phe Leu Ser Gly Arg Gly Asn Leu
 210 215
 Ser Asn Ser Arg Thr Tyr Arg Arg Gln Asn Ser Asp Asn Thr Ser Arg
 225 230 235 240
 Thr Asn Trp Val Pro Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn
 245 250 255
 Thr Ser Asn Asn Ser Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp
 260 265 270
 Ile Asp Ser Leu Leu Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg
 275 280 285
 His Val Glu Ser Asp Gly Leu Val Phe Asp Pro Ala Gln Ile Thr Ser
 290 295 300
 Arg Thr Ala Arg Gly Val Ala Val Pro His Gly Asp His Tyr His Phe
 305 310 315 320
 Ile Pro Tyr Ser Gln Met Ser Glu Leu Glu Glu Arg Ile Ala Arg Ile
 325 330 335
 Ile Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro
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340

345

350

Glu Gln Pro Ser Pro Gln Pro Thr Pro Glu Pro Ser Pro Gly Pro Gln
 355 360 365
 Pro Ala Pro Asn Leu Lys Ile Asp Ser Asn Ser Ser Leu Val Ser Gln
 370 375 380
 Leu Val Arg Lys Val Gly Glu Gly Tyr Val Phe Glu Glu Lys Gly Ile
 385 390 395 400
 Ser Arg Tyr Val Phe Ala Lys Asp Leu Pro Ser Glu Thr Val Lys Asn
 405 410 415
 Leu Glu Ser Lys Leu Ser Lys Gln Glu Ser Val Ser His Thr Leu Thr
 420 425 430
 Ala Lys Lys Glu Asn Val Ala Pro Arg Asp Gln Glu Phe Tyr Asp Lys
 435 440 445
 Ala Tyr Asn Leu Leu Thr Glu Ala His Lys Ala Leu Phe Glu Asn Lys
 450 455 460
 Gly Arg Asn Ser Asp Phe Gln Ala Leu Asp Lys Leu Leu Glu Arg Leu
 465 470 475 480
 Asn Asp Glu Ser Thr Asn Lys Glu Lys Leu Val Asp Asp Leu Leu Ala
 485 490 495
 Phe Leu Ala Pro Ile Thr His Pro Glu Arg Leu Gly Lys Pro Asn Ser
 500 505 510
 Gln Ile Glu Tyr Thr Glu Asp Glu Val Arg Ile Ala Gln Leu Ala Asp
 515 520 525
 Lys Tyr Thr Thr Ser Asp Gly Tyr Ile Phe Asp Glu His Asp Ile Ile
 530 535 540
 Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Gly His Ser His
 545 550 555 560
 Trp Ile Gly Lys Asp Ser Leu Ser Asp Lys Glu Lys Val Ala Ala Gln
 565 570 575
 Ala Tyr Thr Lys Glu Lys Gly Ile Leu Pro Pro Ser Pro Asp Ala Asp
 580 585 590

1028462_1.TXT

Val Lys Ala Asn Pro Thr Gly Asp Ser Ala Ala Ile Tyr Asn Arg
 595 600 605

Val Lys Gly Glu Lys Arg Ile Pro Leu Val Arg Leu Pro Tyr Met Val
 610 615 620

Glu His Thr Val Glu Val Lys Asn Gly Asn Leu Ile Ile Pro His Lys
 625 630 635 640

Asp His Tyr His Asn Ile Lys Phe Ala Trp Phe Asp Asp His Thr Tyr
 645 650 655

Lys Ala Pro Asn Gly Tyr Thr Leu Glu Asp Leu Phe Ala Thr Ile Lys
 660 665 670

Tyr Tyr Val Glu His Pro Asp Glu Arg Pro His Ser Asn Asp Gly Trp
 675 680 685

Gly Asn Ala Ser Glu His Val Leu Gly Lys Lys Asp His Ser Glu Asp
 690 695 700

Pro Asn Lys Asn Phe Lys Ala Asp Glu Glu Pro Val Glu Glu Thr Pro
 705 710 715 720

Ala Glu Pro Glu Val Pro Gln Val Glu Thr Glu Lys Val Glu Ala Gln
 725 730 735

Leu Lys Glu Ala Glu Val Leu Leu Ala Lys Val Thr Asp Ser Ser Leu
 740 745 750

Lys Ala Asn Ala Thr Glu Thr Leu Ala Gly Leu Arg Asn Asn Leu Thr
 755 760 765

Leu Gln Ile Met Asp Asn Asn Ser Ile Met Ala Glu Ala Glu Lys Leu
 770 775 780

Leu Ala Leu Leu Lys Gly Ser Asn Pro Ser Ser Val Ser Lys Glu Lys
 785 790 795 800

Ile Asn

<210> 195
 <211> 1084
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 195

1028462_1.TXT

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 Ala Tyr Thr Thr Pro Thr Val Thr Ser Asn Glu Gly Trp Ile Lys Ile
 20 25 30
 Gly Tyr Thr Glu Arg Asp Val Thr Gln Arg Ile Lys Glu Gln Thr His
 35 40 45
 Thr Ala His Ile Ala Thr Asp Val Leu Trp Thr Gly Asp Ala Ala Tyr
 50 55 60
 Thr Glu Glu Pro Asp Lys Gly Lys Thr Phe Lys Asp His Asp Phe His
 65 70 75 80
 His Phe Leu Ser Phe His Asp Val Glu Arg Arg Pro Lys Thr Glu Trp
 85 90 95
 Phe Tyr Phe Asn Gly Thr Pro Glu Lys Ser Lys Asn Leu Phe Asp Lys
 100 105 110
 Phe Val Gln His Asp Leu Ser Gly Tyr Gln Pro Gly Lys Gly Gln Asp
 115 120 125
 Tyr Thr Leu Arg Gln Glu Gln Glu Glu Ala Val Ala Lys Thr Leu Ala
 130 135 140
 Tyr Phe Gln Glu His Ala Gly Gly Lys Phe Leu Trp Asn Ala Lys Pro
 145 150 155 160
 Arg Phe Gly Lys Thr Leu Ser Thr Tyr Asp Leu Ala Arg Arg Met Glu
 165 170 175
 Ala Val Asn Val Leu Ile Val Thr Asn Arg Pro Ala Ile Ala Asn Ser
 180 185 190
 Trp Tyr Asp Asp Phe Glu Thr Phe Ile Ala Gly Gln Thr Thr Tyr Lys
 195 200 205
 Phe Val Ser Glu Ser Asp Ser Leu Lys Ser Arg Pro Ile Leu Ser Arg
 210 215 220
 Gln Glu Phe Leu Gly Ile Leu Ala Asp Asp Val Arg Gln Leu Ala Phe
 225 230 235 240
 Ile Ser Leu Gln Asp Leu Lys Gly Ser Val Tyr Leu Gly Gly Glu His
 245 250 255

1028462_1.TXT

Asp Lys Leu Lys Trp Val Thr Asp Leu His Trp Asp Leu Val Ile
 260 265 270
 Asp Glu Ala His Glu Gly Val Asp Thr Phe Lys Thr Asp Gln Ala Phe
 275 280 285
 Asn Lys Ile Arg Arg Asn Phe Thr Leu His Leu Ser Gly Thr Ser Phe
 290 295 300
 Lys Ala Leu Ala Lys Gly Asp Phe Thr Glu Glu Gln Ile Tyr Asn Trp
 305 310 315
 Ser Tyr Ala Asp Glu Gln Ala Ala Lys Tyr Ser Trp Ser Leu Glu Gln
 325 330 335
 Glu Glu Glu Asn Pro Tyr Glu Ser Leu Pro Gln Leu Asn Leu Phe Thr
 340 345 350
 Tyr Gln Met Ser Gln Met Ile Gly Glu Lys Leu Glu Lys Gly Ala Gln
 355 360 365
 Ile Asp Gly Glu Asn Ile Asp Tyr Val Phe Asp Leu Ser Glu Phe Phe
 370 375 380
 Ala Thr Asp Asp Lys Gly Lys Phe Ile His Glu His Asp Val Arg Asn
 385 390 395 400
 Trp Leu Asp Thr Leu Ser Ser Asn Glu Lys Tyr Pro Phe Ser Thr Lys
 405 410 415
 Glu Leu Arg Asn Glu Leu Lys His Thr Phe Trp Leu Leu Glu Arg Val
 420 425 430
 Ala Ser Ala Lys Ala Leu Lys Ala Leu Leu Glu Glu His Pro Ile Tyr
 435 440 445
 Glu Asn Tyr Glu Ile Val Leu Ala Ala Gly Asp Gly Arg Met Ser Glu
 450 455 460
 Glu Asp Asp Lys Val Lys Leu Lys Ser Leu Asp Leu Val Arg Lys Ala
 465 470 475 480
 Ile Ala Glu Asn Asp Lys Thr Ile Thr Leu Ser Val Gly Gln Leu Thr
 485 490 495
 Thr Gly Val Thr Ile Pro Glu Trp Thr Gly Val Leu Met Leu Ser Asn
 500 505 510

1028462_1.TXT

Leu Lys Ser Pro Ala Leu Tyr Met Gln Ala Ala Phe Arg Ala Gln Asn
 515 520 525
 Pro Tyr Ser Trp Ser Asp Asn Lys Gly Asn His Phe Arg Lys Glu Arg
 530 535 540
 Ala Tyr Val Phe Asp Phe Ala Pro Glu Arg Thr Leu Ile Leu Phe Asp
 545 550 555 560
 Glu Phe Ala Asn Asn Leu Leu Leu Val Thr Ala Ala Gly Arg Gly Thr
 565 570 575
 Ser Ala Thr Arg Glu Glu Asn Ile Arg Glu Leu Leu Asn Phe Phe Pro
 580 585 590
 Ile Ile Ala Glu Asp Arg Ala Gly Lys Met Val Glu Ile Asp Ala Lys
 595 600 605
 Ala Val Leu Thr Thr Pro Arg Gln Ile Lys Ala Arg Glu Val Leu Lys
 610 615 620
 Arg Gly Phe Met Ser Asn Leu Leu Phe Asp Asn Ile Ser Gly Ile Phe
 625 630 635 640
 Gln Ala Ser Gln Thr Val Leu Asp Ile Leu Asn Glu Leu Pro Val Glu
 645 650 655
 Lys Glu Gly Lys Val Gln Asp Ser Ser Asp Leu Leu Asp Phe Ser Asp
 660 665 670
 Val Thr Val Asp Asp Glu Gly Asn Ala Val Val Asp His Glu Ile Val
 675 680 685
 Val Asn Gln Gln Met Arg Leu Phe Gly Glu Lys Val Tyr Gly Leu Gly
 690 695 700
 Glu Ser Val Ala Glu Leu Val Thr Lys Asp Glu Glu Arg Thr Gln Lys
 705 710 715 720
 Gln Leu Val Asn Asp Leu Ser Lys Thr Val Ser Ser Val Ile Val Glu
 725 730 735
 Glu Leu Lys Ala Asp Tyr Ser Leu Lys Thr Arg Glu Thr Glu Gln Ile
 740 745 750
 Lys Lys Gln Ile Thr Ala Thr Leu Glu Asn Glu Ile Arg Lys Asn Asp

755

760

765

Ile Glu Arg Lys Ile Ser Glu Ala His Ile Lys Gln Glu Leu Gln Gln
 770 775 780

Gln Leu Lys Glu Ala Asn Asp Lys Ala Gln Lys Asp Lys Ile Gln Glu
 785 790 795 800

Asp Leu Glu Lys Arg Leu Glu Glu Asn Lys Leu Ile His Lys Glu Lys
 805 810 815

Leu Glu Gln Thr Leu Lys Lys Glu Val Glu Lys Met Pro Glu Lys Phe
 820 825 830

Ile Glu Gln Val Glu Ile Lys Arg Val Glu Gln Leu Lys Gln Ser Ala
 835 840 845

Gln Asp Glu Ile Arg Asp His Leu Arg Gly Phe Ala Arg Thr Ile Pro
 850 855 860

Ser Phe Ile Met Ala Tyr Gly Asp Gln Thr Leu Thr Leu Asp Asn Phe
 865 870 875 880

Asp Ala Phe Val Pro Glu His Val Phe Tyr Glu Val Thr Gly Ile Thr
 885 890 895

Ile Asp Gln Phe Arg Tyr Leu Arg Asp Gly Gly Gln Asp Phe Ala Gly
 900 905 910

His Leu Phe Asp Lys Ala Thr Phe Asp Glu Ala Ile Gln Glu Phe Leu
 915 920 925

Arg Lys Lys Lys Glu Leu Ala Asp Tyr Phe Lys Asp Gln Lys Glu Asp
 930 935 940

Ile Phe Asp Tyr Ile Pro Pro Gln Lys Thr Asn Gln Ile Phe Thr Pro
 945 950 955 960

Lys Arg Val Val Lys Arg Met Val Asp Asp Leu Glu Lys Glu Asn Pro
 965 970 975

Gly Ile Phe Asp Asp Pro Ser Lys Thr Phe Ile Asp Leu Tyr Met Lys
 980 985 990

Ser Gly Leu Tyr Ile Ala Glu Leu Val Lys Arg Leu Tyr Asn Ser Asn
 995 1000 1005

1028462_1.TXT

Gly Leu Lys Glu Ala Phe Pro Asn Pro Glu Glu Arg Leu Lys His
 1010 1015 1020

Ile Leu Glu Lys Gln Val Tyr Gly Phe Ala Pro Ser Glu Ile Ile
 1025 1030 1035

Tyr Asn Ile Ser Thr Asn Phe Ile Phe Gly Asn Leu Ser Lys Asp
 1040 1045 1050

Ile Ser Arg Lys Asn Phe Val Leu Ala Asp Thr Ile Pro Ala Ala
 1055 1060 1065

Lys Glu Gly Ser Ile Gln Lys Leu Val Asp Ser Tyr Phe Glu Asn
 1070 1075 1080

Asn

<210> 196
 <211> 234
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 196

Met Lys Lys Ile Leu Ile Val Asp Asp Glu Lys Pro Ile Ser Asp Ile
 1 5 10 15

Ile Lys Phe Asn Met Thr Lys Glu Gly Tyr Glu Val Val Thr Ala Phe
 20 25 30

Asn Gly Arg Glu Ala Leu Glu Gln Phe Glu Ala Glu Gln Pro Asp Ile
 35 40 45

Ile Ile Leu Asp Leu Met Leu Pro Glu Ile Asp Gly Leu Glu Val Ala
 50 55 60

Lys Thr Ile Arg Lys Thr Ser Ser Val Pro Ile Leu Met Leu Ser Ala
 65 70 75 80

Lys Asp Ser Glu Phe Asp Lys Val Ile Gly Leu Glu Leu Gly Ala Asp
 85 90 95

Asp Tyr Val Thr Lys Pro Phe Ser Asn Arg Glu Leu Gln Ala Arg Val
 100 105 110

Lys Ala Leu Leu Arg Arg Ser Gln Pro Met Pro Val Asp Gly Gln Glu
 115 120 125

1028462_1.TXT

Ala Asp Ser Lys Pro Gln Pro Ile Gln Ile Gly Asp Leu Glu Ile Val
 130 135 140

Pro Asp Ala Tyr Val Ala Lys Lys Tyr Gly Glu Glu Leu Asp Leu Thr
 145 150 155 160

His Arg Glu Phe Glu Leu Leu Tyr His Leu Ala Ser His Thr Gly Gln
 165 170 175

Val Ile Thr Arg Glu His Leu Leu Glu Thr Val Trp Gly Tyr Asp Tyr
 180 185 190

Phe Gly Asp Val Arg Thr Val Asp Val Thr Val Arg Arg Leu Arg Glu
 195 200 205

Lys Ile Glu Asp Thr Pro Ser Arg Pro Glu Tyr Ile Leu Thr Arg Arg
 210 215 220

Gly Val Gly Tyr Tyr Met Arg Asn Asn Ala
 225 230

<210> 197

<211> 721

<212> PRT

<213> Streptococcus pneumoniae

<400> 197

Met Lys Lys Lys Phe Leu Ala Phe Leu Leu Ile Leu Phe Pro Ile Phe
 1 5 10 15

Ser Leu Gly Ile Ala Lys Ala Glu Thr Ile Lys Ile Val Ser Asp Thr
 20 25 30

Ala Tyr Ala Pro Phe Glu Phe Lys Asp Ser Asp Gln Thr Tyr Lys Gly
 35 40 45

Ile Asp Val Asp Ile Ile Asn Lys Val Ala Glu Ile Lys Gly Trp Asn
 50 55 60

Ile Gln Met Ser Tyr Pro Gly Phe Asp Ala Ala Val Asn Ala Val Gln
 65 70 75 80

Ala Gly Gln Ala Asp Ala Ile Met Ala Gly Met Thr Lys Thr Lys Glu
 85 90 95

Arg Glu Lys Val Phe Thr Met Ser Asp Thr Tyr Tyr Asp Thr Lys Val
 100 105 110

1028462_1.TXT

val Ile Ala Thr Thr Lys Ser His Lys Ile Ser Lys Tyr Asp Gln Leu
 115 120 125
 Thr Gly Lys Thr Val Gly Val Lys Asn Gly Thr Ala Ala Gln Arg Phe
 130 135 140
 Leu Glu Thr Ile Lys Asp Lys Tyr Gly Phe Thr Ile Lys Thr Phe Asp
 145 150 155 160
 Thr Gly Asp Leu Met Asn Asn Ser Leu Ser Ala Gly Ala Ile Asp Ala
 165 170 175
 Met Met Asp Asp Lys Pro Val Ile Glu Tyr Ala Ile Asn Gln Gly Gln
 180 185 190
 Asp Leu His Ile Glu Met Asp Gly Glu Ala Val Gly Ser Phe Ala Phe
 195 200 205
 Gly Val Lys Lys Gly Ser Lys Tyr Glu His Leu Val Thr Glu Phe Asn
 210 215 220
 Gln Ala Leu Ser Glu Met Lys Lys Asp Gly Ser Leu Asp Lys Ile Ile
 225 230 235 240
 Lys Lys Trp Thr Ala Ser Ser Ser Ser Ala Val Pro Thr Thr Thr Thr
 245 250 255
 Leu Ala Gly Leu Lys Ala Ile Pro Val Lys Ala Lys Tyr Ile Ile Ala
 260 265 270
 Ser Asp Ser Ser Phe Ala Pro Phe Val Phe Gln Asn Ser Ser Asn Gln
 275 280 285
 Tyr Thr Gly Ile Asp Met Glu Leu Ile Lys Ala Ile Ala Lys Asp Gln
 290 295 300
 Gly Phe Glu Ile Glu Ile Thr Asn Pro Gly Phe Asp Ala Ala Ile Ser
 305 310 315 320
 Ala Val Gln Ala Gly Gln Ala Asp Gly Ile Ile Ala Gly Met Ser Val
 325 330 335
 Thr Asp Ala Arg Lys Ala Thr Phe Asp Phe Ser Glu Ser Tyr Tyr Thr
 340 345 350
 Ala Asn Thr Ile Leu Gly Val Lys Glu Ser Ser Asn Ile Ala Ser Tyr
 355 360 365

1028462_1.TXT

Glu Asp Leu Lys Gly Lys Thr Val Gly Val Lys Asn Gly Thr Ala Ser
 370 375 380

Gln Thr Phe Leu Thr Glu Asn Gln Ser Lys Tyr Gly Tyr Lys Ile Lys
 385 390 395 400

Thr Phe Ala Asp Gly Ser Ser Met Tyr Asp Ser Leu Asn Thr Gly Ala
 405 410 415

Ile Asp Ala Val Met Asp Asp Glu Pro Val Leu Lys Tyr Ser Ile Ser
 420 425 430

Gln Gly Gln Lys Leu Lys Thr Pro Ile Ser Gly Thr Pro Ile Gly Glu
 435 440 445

Thr Ala Phe Ala Val Lys Lys Gly Ala Asn Pro Glu Leu Ile Glu Met
 450 455 460

Phe Asn Asn Gly Leu Ala Asn Leu Lys Ala Asn Gly Glu Phe Gln Lys
 465 470 475 480

Ile Leu Asp Lys Tyr Leu Ala Ser Glu Ser Ser Thr Ala Ser Thr Ser
 485 490 495

Thr Val Asp Glu Thr Thr Leu Trp Gly Leu Leu Gln Asn Asn Tyr Lys
 500 505 510

Gln Leu Leu Ser Gly Leu Gly Ile Thr Leu Ala Leu Ala Leu Ile Ser
 515 520 525

Phe Ala Ile Ala Ile Val Ile Gly Ile Ile Phe Gly Met Phe Ser Val
 530 535 540

Ser Pro Tyr Lys Ser Leu Arg Val Ile Ser Glu Ile Phe Val Asp Val
 545 550 555 560

Ile Arg Gly Ile Pro Leu Met Ile Leu Ala Ala Phe Ile Phe Trp Gly
 565 570 575

Ile Pro Asn Phe Ile Glu Ser Ile Thr Gly Gln Gln Ser Pro Ile Asn
 580 585 590

Asp Phe Val Ala Gly Thr Ile Ala Leu Ser Leu Asn Ala Ala Ala Tyr
 595 600 605

Ile Ala Glu Ile Val Arg Gly Gly Ile Gln Ala Val Pro Val Gly Gln
 610 615 620

1028462_1.TXT

Met Glu Ala Ser Arg Ser Leu Gly Ile Ser Tyr Gly Lys Thr Met Arg
625 630 635 640

Lys Ile Ile Leu Pro Gln Ala Thr Lys Leu Met Leu Pro Asn Phe Val
645 650 655

Asn Gln Phe Val Ile Ala Leu Lys Asp Thr Thr Ile Val Ser Ala Ile
660 665 670

Gly Leu Val Glu Leu Phe Gln Thr Gly Lys Ile Ile Ile Ala Arg Asn
675 680 685

Tyr Gln Ser Phe Lys Met Tyr Ala Ile Leu Ala Ile Phe Tyr Leu Val
690 695 700

Ile Ile Thr Leu Leu Thr Arg Leu Ala Lys Arg Leu Glu Lys Arg Ile
705 710 715 720

Arg

<210> 198
<211> 523
<212> PRT
<213> Streptococcus pneumoniae
<400> 198

Met Ala Phe Glu Ser Leu Thr Glu Arg Leu Gln Asn Val Phe Lys Asn
1 5 10 15

Leu Arg Lys Lys Gly Lys Ile Ser Glu Ser Asp Val Gln Glu Ala Thr
20 25 30

Lys Glu Ile Arg Leu Ala Leu Leu Glu Ala Asp Val Ala Leu Pro Val
35 40 45

Val Lys Asp Phe Ile Lys Lys Val Arg Glu Arg Ala Val Gly His Glu
50 55 60

Val Ile Asp Thr Leu Asn Pro Ala Gln Gln Ile Ile Lys Ile Val Asp
65 70 75 80

Glu Glu Leu Thr Ala Val Leu Gly Ser Asp Thr Ala Glu Ile Ile Lys
85 90 95

Ser Pro Lys Ile Pro Thr Ile Ile Met Met Val Gly Leu Gln Gly Ala
100 105 110

1028462_1.TXT

Gly Lys Thr Thr Phe Ala Gly Lys Leu Ala Asn Lys Leu Lys Lys Glu
 115 120 125
 Glu Asn Ala Arg Pro Leu Met Ile Ala Ala Asp Ile Tyr Arg Pro Ala
 130 135 140
 Ala Ile Asp Gln Leu Lys Thr Leu Gly Gln Gln Ile Asp Val Pro Val
 145 150 155 160
 Phe Ala Leu Gly Thr Glu Val Pro Ala Val Glu Ile Val Arg Gln Gly
 165 170 175
 Leu Glu Gln Ala Gln Thr Asn His Asn Asp Tyr Val Leu Ile Asp Thr
 180 185 190
 Ala Gly Arg Leu Gln Ile Asp Glu Leu Leu Met Asn Glu Leu Arg Asp
 195 200 205
 Val Lys Ala Leu Ala Gln Pro Asn Glu Ile Leu Leu Val Val Asp Ala
 210 215 220
 Met Ile Gly Gln Glu Ala Ala Asn Val Ala Arg Glu Phe Asn Ala Gln
 225 230 235 240
 Leu Glu Val Thr Gly Val Ile Leu Thr Lys Ile Asp Gly Asp Thr Arg
 245 250 255
 Gly Gly Ala Ala Leu Ser Val Arg His Ile Thr Gly Lys Pro Ile Lys
 260 265 270
 Phe Thr Gly Thr Gly Glu Lys Ile Thr Asp Ile Glu Thr Phe His Pro
 275 280 285
 Asp Arg Met Ser Ser Arg Ile Leu Gly Met Gly Asp Met Leu Thr Leu
 290 295 300
 Ile Glu Lys Ala Ser Gln Glu Tyr Asp Glu Gln Lys Ala Leu Glu Met
 305 310 315 320
 Ala Glu Lys Met Arg Glu Asn Thr Phe Asp Phe Asn Asp Phe Ile Asp
 325 330 335
 Gln Leu Asp Gln Val Gln Asn Met Gly Pro Met Glu Asp Leu Leu Lys
 340 345 350
 Met Ile Pro Gly Met Ala Asn Asn Pro Ala Leu Gln Asn Met Lys Val
 Page 267

355

360

365

Asp Glu Arg Gln Ile Ala Arg Lys Arg Ala Ile Val Ser Ser Met Thr
 370 375 380

Pro Glu Glu Arg Glu Asn Pro Asp Leu Leu Asn Pro Ser Arg Arg Arg
 385 390 395 400

Arg Ile Ala Ala Gly Ser Gly Asn Thr Phe Val Glu Val Asn Lys Phe
 405 410 415

Ile Lys Asp Phe Asn Gln Ala Lys Gln Leu Met Gln Gly Val Met Ser
 420 425 430

Gly Asp Met Asn Lys Met Met Lys Gln Met Gly Ile Asn Pro Asn Asn
 435 440 445

Leu Pro Lys Asn Met Pro Asn Met Gly Gly Met Asp Met Ser Ala Leu
 450 455 460

Glu Gly Met Met Gly Gln Gly Gly Met Pro Asp Leu Ser Ala Leu Gly
 465 470 475 480

Gly Ala Gly Met Pro Asp Met Ser Gln Met Phe Gly Gly Gly Leu Lys
 485 490 495

Gly Lys Ile Gly Glu Phe Ala Met Lys Gln Ser Met Lys Arg Met Ala
 500 505 510

Asn Lys Met Lys Lys Ala Lys Lys Lys Arg Lys
 515 520

<210> 199
 <211> 233
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 199

Met Ser Gln Ile Trp Thr Lys Glu Lys Phe Ile Ser Gln Val Gln Gly
 1 5 10 15

Gly Val Ile Val Ser Cys Gln Ala Leu Pro Gly Glu Ala Leu Tyr Asn
 20 25 30

Glu Glu Phe Ser Leu Met Pro Phe Met Ala Lys Ala Ala Leu Glu Ala
 35 40 45

Gly Ala Val Gly Ile Arg Ala Asn Ser Val Arg Asp Ile Lys Ala Ile
 Page 268

50

55

Gln Lys Val Val Asp Leu Pro Ile Ile Gly Ile Ile Lys Arg Asp Tyr
65 70 75 80

Pro Pro Gln Glu Pro Tyr Ile Thr Ala Thr Met Lys Glu Val Asp Glu
85 90 95

Leu Val Glu Cys Gly Thr Thr Val Ile Ala Phe Asp Ala Thr Leu Arg
100 105 110

Pro Arg Tyr Asp Gly Leu Val Val Ser Glu Phe Ile Lys Lys Ile Lys
115 120 125

Glu Lys Tyr Pro Asn Gln Leu Leu Met Ala Asp Val Ser Asn Leu Asp
130 135 140

Glu Gly Leu Tyr Ala Phe Lys Ser Gly Val Asp Phe Val Gly Thr Thr
145 150 155 160

Leu Ser Gly Tyr Thr Ser Thr Ser Val Gln Ser Asp Glu Pro Asp Phe
165 170 175

Glu Leu Met Lys Lys Leu Ala Asp Phe Asn Ile Pro Val Ile Ala Glu
180 185 190

Gly Lys Ile His Tyr Pro Glu Gln Leu Lys Lys Ala Tyr Ser Leu Gly
195 200 205

Val Thr Ser Val Val Ile Gly Gly Ala Ile Thr Arg Pro Lys Glu Ile
210 215 220

Ala Gln Arg Phe Ile Asn Val Ile Lys
225 230

<210> 200
<211> 388
<212> PRT
<213> Streptococcus pneumoniae

<400> 200

Met Arg Tyr Leu Thr Ala Gly Glu Ser His Gly Pro Arg Leu Thr Ala
1 5 10 15

Ile Ile Glu Gly Ile Pro Ala Gly Leu Pro Leu Thr Ala Glu Asp Ile
20 25 30

Asn Glu Asp Leu Arg Arg Arg Gln Gly Gly Tyr Gly Arg Gly Gly Arg
Page 269

Met Lys Ile Glu Asn Asp Gln Val Val Phe Thr Ser Gly Val Arg His
 50 55
 Gly Lys Thr Thr Gly Ala Pro Ile Thr Met Asp Val Ile Asn Lys Asp
 65 70 75 80
 His Gln Lys Trp Leu Asp Ile Met Ser Ala Glu Asp Ile Glu Asp Arg
 85 90 95
 Leu Lys Ser Lys Arg Lys Ile Thr His Pro Arg Pro Gly His Ala Asp
 100 105 110
 Leu Val Gly Gly Ile Lys Tyr Arg Phe Asp Asp Leu Arg Asn Ser Leu
 115 120 125
 Glu Arg Ser Ser Ala Arg Glu Thr Thr Met Arg Val Ala Val Gly Ala
 130 135 140
 Val Ala Lys Arg Leu Leu Ala Glu Leu Asp Met Glu Ile Ala Asn His
 145 150 155 160
 Val Val Val Phe Gly Gly Lys Glu Ile Asp Val Pro Glu Asn Leu Thr
 165 170 175
 Val Ala Glu Ile Lys Gln Arg Ala Ala Gln Ser Glu Val Ser Ile Val
 180 185 190
 Asn Gln Glu Arg Glu Gln Glu Ile Lys Asp Tyr Ile Asp Gln Ile Lys
 195 200 205
 Arg Asp Gly Asp Thr Ile Gly Gly Val Val Glu Thr Val Val Gly Gly
 210 215 220
 Val Pro Val Gly Leu Gly Ser Tyr Val Gln Trp Asp Arg Lys Leu Asp
 225 230 235 240
 Ala Arg Leu Ala Gln Ala Val Val Ser Ile Asn Ala Phe Lys Gly Val
 245 250 255
 Glu Phe Gly Leu Gly Phe Glu Ala Gly Tyr Arg Lys Gly Ser Gln Val
 260 265 270
 Met Asp Glu Ile Leu Trp Ser Lys Glu Asp Gly Tyr Thr Arg Arg Thr
 275 280 285

1028462_1.TXT

Asn Asn Leu Gly Gly Phe Glu Gly Gly Met Thr Asn Gly Gln Pro Ile
 290 295 300

Val Val Arg Gly Val Met Lys Pro Ile Pro Thr Leu Tyr Lys Pro Leu
 305 310 315 320

Met Ser Val Asp Ile Glu Thr His Glu Pro Tyr Lys Ala Thr Val Glu
 325 330 335

Arg Ser Asp Pro Thr Ala Leu Pro Ala Ala Gly Met Val Met Glu Ala
 340 345 350

Val Val Ala Thr Val Leu Ala Gln Glu Ile Leu Glu Lys Phe Ser Ser
 355 360 365

Asp Asn Leu Glu Glu Leu Lys Glu Ala Val Ala Lys His Arg Asp Tyr
 370 375 380

Thr Lys Asn Tyr
 385

<210> 201

<211> 390

<212> PRT

<213> Streptococcus pneumoniae

<400> 201

Met Val Val Met Asn Arg Ile Arg Val Ser Lys Arg Val Glu Lys Lys
 1 5 10 15

Leu Ala Lys Gly Leu Val Leu Leu Glu Ala Ser Asp Leu Glu Asn Val
 20 25 30

Asn Leu Lys Asp Gln Glu Val Glu Val Gln Gly Gln Glu Gly Asn Phe
 35 40 45

Leu Gly Thr Ala Tyr Leu Ser Gln Gln Asn Lys Gly Leu Gly Trp Phe
 50 55 60

Ile Ser Lys Asp Lys Val Ala Phe Asn Gln Ala Phe Phe Glu Thr Leu
 65 70 75 80

Phe Arg Lys Ala Lys Glu Lys Arg Asn Ala Tyr Tyr Gln Asp Asp Leu
 85 90 95

Thr Thr Ala Phe Arg Leu Phe Asn Gln Glu Gly Asp Gly Phe Gly Gly
 100 105 110

1028462_1.TXT

Leu Thr Val Asp Leu Tyr Gly Asp Tyr Ala Val Phe Ser Trp Tyr Asn
 115 120 125
 Ser Tyr Val Tyr Gln Ile Arg Gln Thr Ile Ser Glu Ala Phe Arg Gln
 130 135 140
 Val Phe Pro Glu Val Leu Gly Ala Tyr Glu Lys Ile Arg Phe Lys Gly
 145 150 155 160
 Leu Asp Tyr Glu Ser Ala His Val Tyr Gly Gln Glu Ala Pro Asp Phe
 165 170 175
 Phe Asn Val Leu Glu Asn Gly Val Leu Tyr Gln Val Phe Met Asn Asp
 180 185 190
 Gly Leu Met Thr Gly Ile Phe Leu Asp Gln His Glu Val Arg Gly Ser
 195 200 205
 Leu Val Asp Gly Leu Ala Met Gly Lys Ser Leu Leu Asn Met Phe Ser
 210 215 220
 Tyr Thr Ala Ala Phe Ser Val Ala Ala Ala Met Gly Gly Ala Ser His
 225 230 235 240
 Thr Thr Ser Val Asp Leu Ala Lys Arg Ser Arg Glu Leu Ser Gln Ala
 245 250 255
 His Phe Gln Ala Asn Gly Leu Ser Thr Asp Glu His Arg Phe Ile Val
 260 265 270
 Met Asp Val Phe Glu Tyr Phe Lys Tyr Ala Lys Arg Lys Asp Leu Thr
 275 280 285
 Tyr Asp Val Ile Val Leu Asp Pro Pro Ser Phe Ala Arg Asn Lys Lys
 290 295 300
 Gln Thr Phe Ser Val Ala Lys Asp Tyr His Lys Leu Ile Ser Gln Ser
 305 310 315 320
 Leu Glu Ile Leu Asn Pro Gly Gly Ile Ile Ile Ala Ser Thr Asn Ala
 325 330 335
 Ala Asn Val Ser Arg Gln Lys Phe Thr Glu Gln Ile Asp Lys Gly Phe
 340 345 350
 Ala Gly Arg Ser Tyr Gln Ile Leu Asn Lys Tyr Gly Leu Pro Ala Asp
 355 360 365

1028462_1.TXT

Phe Ala Tyr Asn Lys Lys Asp Glu Ser Ser Asn Tyr Leu Lys Val Ile
 370 375 380

Ser Met Lys Val Ser Lys
 385 390

<210> 202
 <211> 428
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 202

Met Thr Lys Thr Leu Lys Arg Pro Glu Val Leu Ser Pro Ala Gly Thr
 1 5 10 15

Leu Glu Lys Leu Lys Val Ala Val Gln Tyr Gly Ala Asp Ala Val Phe
 20 25 30

Ile Gly Gly Gln Ala Tyr Gly Leu Arg Ser Arg Ala Gly Asn Phe Thr
 35 40 45

Phe Glu Gln Met Glu Glu Gly Val Gln Phe Ala Ala Lys Tyr Gly Ala
 50 55 60

Lys Val Tyr Val Ala Ala Asn Met Val Met His Glu Gly Asn Glu Ala
 65 70 75 80

Gly Ala Gly Glu Trp Phe Arg Lys Leu Arg Asp Ile Gly Ile Ala Ala
 85 90 95

Val Ile Val Ser Asp Pro Ala Leu Ile Met Ile Ala Val Thr Glu Ala
 100 105 110

Pro Gly Leu Glu Ile His Leu Ser Thr Gln Ala Ser Ala Thr Asn Tyr
 115 120 125

Glu Thr Leu Glu Phe Trp Lys Glu Leu Gly Leu Thr Arg Val Val Leu
 130 135 140

Ala Arg Glu Val Ser Met Glu Glu Leu Ala Glu Ile Arg Lys Arg Thr
 145 150 155 160

Asp Val Glu Ile Glu Ala Phe Val His Gly Ala Met Cys Ile Ser Tyr
 165 170 175

Ser Gly Arg Cys Thr Leu Ser Asn His Met Ser Met Arg Asp Ala Asn
 180 185 190

1028462_1.TXT

Arg Gly Gly Cys Ser Gln Ser Cys Arg Trp Lys Tyr Asp
 195 200 205
 Met Pro Phe Gly Lys Glu Arg Lys Ser Leu Gln Gly Glu Ile Pro Glu
 210 215
 Glu Phe Ser Met Ser Ala Val Asp Met Ser Met Ile Asp His Ile Pro
 225 230 235 240
 Asp Met Ile Glu Asn Gly Val Asp Ser Leu Lys Ile Glu Gly Arg Met
 245 250 255
 Lys Ser Ile His Tyr Val Ser Thr Val Thr Asn Cys Tyr Lys Ala Ala
 260 265 270
 Val Asp Ala Tyr Leu Glu Ser Pro Glu Lys Phe Glu Ala Ile Lys Gln
 275 280 285
 Asp Leu Val Asp Glu Met Trp Lys Val Ala Gln Arg Glu Leu Ala Thr
 290 295 300
 Gly Phe Tyr Tyr Gly Thr Pro Ser Glu Asn Glu Gln Leu Phe Gly Ala
 305 310 315 320
 Arg Arg Lys Ile Pro Glu Tyr Lys Phe Val Ala Glu Val Val Ser Tyr
 325 330 335
 Asp Asp Ala Ala Gln Thr Ala Thr Ile Arg Gln Arg Asn Val Ile Asn
 340 345 350
 Glu Gly Asp Gln Val Glu Phe Tyr Gly Pro Gly Phe Arg His Phe Glu
 355 360 365
 Thr Tyr Ile Glu Asp Leu His Asp Ala Lys Gly Asn Lys Ile Asp Arg
 370 375 380
 Ala Pro Asn Pro Met Glu Leu Leu Thr Ile Lys Val Pro Gln Pro Val
 385 390 395 400
 Gln Ser Gly Asp Met Val Arg Ala Leu Lys Glu Gly Leu Ile Asn Leu
 405 410 415
 Tyr Lys Glu Asp Gly Thr Ser Val Thr Val Arg Ala
 420 425

<210> 203
 <211> 280

1028462_1.TXT

<212> PRT

<213> Streptococcus pneumoniae

<400> 203

Met Asn Thr Tyr Gln Leu Asn Asn Gly Val Glu Ile Pro Val Leu Gly
1 5 10 15Phe Gly Thr Phe Lys Ala Lys Asp Gly Glu Glu Ala Tyr Arg Ala Val
20 25 30Leu Glu Ala Leu Lys Ala Gly Tyr Arg His Ile Asp Thr Ala Ala Ile
35 40 45Tyr Gln Asn Glu Glu Ser Val Gly Gln Ala Ile Lys Asp Ser Gly Val
50 55 60Pro Arg Glu Glu Met Phe Val Thr Thr Lys Leu Trp Asn Ser Gln Gln
65 70 75 80Thr Tyr Glu Gln Thr Arg Gln Ala Leu Glu Lys Ser Ile Glu Lys Leu
85 90 95Gly Leu Asp Tyr Leu Asp Leu Tyr Leu Ile His Trp Pro Asn Pro Lys
100 105 110Pro Leu Arg Glu Asn Asp Ala Trp Lys Thr Arg Asn Ala Glu Val Trp
115 120 125Arg Ala Met Glu Asp Leu Tyr Gln Glu Gly Lys Ile Arg Ala Ile Gly
130 135 140Val Ser Asn Phe Leu Pro His His Leu Asp Ala Leu Leu Glu Thr Ala
145 150 155 160Thr Ile Val Pro Ala Val Asn Gln Val Arg Leu Ala Pro Gly Val Tyr
165 170 175Gln Asp Gln Val Val Ala Tyr Cys Arg Glu Lys Gly Ile Leu Leu Glu
180 185 190Ala Trp Gly Pro Phe Gly Gln Gly Glu Leu Phe Asp Ser Lys Gln Val
195 200 205Gln Glu Ile Ala Ala Asn His Gly Lys Ser Val Ala Gln Ile Ala Leu
210 215 220Ala Trp Ser Leu Ala Glu Gly Phe Leu Pro Leu Pro Lys Ser Val Thr
225 230 235 240

1028462_1.TXT

Thr Ser Arg Ile Gln Ala Asn Leu Asp Cys Phe Gly Ile Glu Leu Ser
 245 250 255

His Glu Glu Arg Glu Thr Leu Lys Thr Ile Ala Val Gln Ser Gly Ala
 260 265 270

Pro Arg Val Asp Asp Val Asp Phe
 275 280

<210> 204
 <211> 551
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 204

Leu Ser Glu Lys Ser Arg Glu Glu Glu Lys Leu Ser Phe Lys Glu Gln
 1 5 10 15

Ile Leu Arg Asp Leu Glu Lys Val Lys Gly Tyr Asp Glu Val Leu Lys
 20 25 30

Glu Asp Glu Ala Val Val Arg Thr Pro Ala Asn Glu Pro Ser Thr Glu
 35 40 45

Glu Leu Met Ala Asp Ser Leu Ser Thr Val Glu Glu Ile Met Arg Lys
 50 55 60

Ala Pro Thr Val Pro Thr His Pro Ser Gln Gly Val Pro Ala Ser Pro
 65 70 75 80

Ala Asp Glu Ile Gln Arg Glu Thr Pro Gly Val Pro Ser His Pro Ser
 85 90 95

Gln Asp Val Pro Ser Ser Pro Ala Glu Glu Ser Gly Ser Arg Pro Gly
 100 105 110

Pro Gly Pro Val Arg Pro Lys Lys Leu Glu Arg Glu Tyr Asn Glu Thr
 115 120 125

Pro Thr Arg Val Ala Val Ser Tyr Thr Thr Ala Glu Lys Lys Ala Glu
 130 135 140

Gln Ala Gly Pro Glu Thr Pro Thr Pro Ala Thr Glu Thr Val Asp Ile
 145 150 155 160

Ile Arg Asp Thr Ser Arg Arg Ser Arg Arg Glu Gly Ala Lys Pro Val
 165 170 175

1028462_1.TXT

Lys Pro Lys Lys Glu Lys Lys Ser His Val Lys Ala Phe Val Ile Ser
 180 185 190
 Phe Leu Val Phe Leu Ala Leu Leu Ser Ala Gly Gly Tyr Phe Gly Tyr
 195 200 205
 Gln Tyr Val Leu Asp Ser Leu Leu Pro Ile Asp Ala Asn Ser Lys Lys
 210 215 220
 Tyr Val Thr Val Gly Ile Pro Glu Gly Ser Asn Val Gln Glu Ile Gly
 225 230 235 240
 Thr Thr Leu Glu Lys Ala Gly Leu Val Lys His Gly Leu Ile Phe Ser
 245 250 255
 Phe Tyr Ala Lys Tyr Lys Asn Tyr Thr Asp Leu Lys Ala Gly Tyr Tyr
 260 265 270
 Asn Leu Gln Lys Ser Met Ser Thr Glu Asp Leu Leu Lys Glu Leu Gln
 275 280 285
 Lys Gly Gly Thr Asp Glu Pro Gln Glu Pro Val Leu Ala Thr Leu Thr
 290 295 300
 Ile Pro Glu Gly Tyr Thr Leu Asp Gln Ile Ala Gln Ala Val Gly Gln
 305 310 315 320
 Leu Gln Gly Asp Phe Lys Glu Ser Leu Thr Ala Glu Ala Phe Leu Ala
 325 330 335
 Lys Val Gln Asp Glu Thr Phe Ile Ser Gln Ala Val Ala Lys Tyr Pro
 340 345 350
 Thr Leu Leu Glu Ser Leu Pro Val Lys Asp Ser Gly Ala Arg Tyr Arg
 355 360 365
 Leu Glu Gly Tyr Leu Phe Pro Ala Thr Tyr Ser Ile Lys Glu Ser Thr
 370 375 380
 Thr Ile Glu Ser Leu Ile Asp Glu Met Leu Ala Ala Met Asp Lys Asn
 385 390 395 400
 Leu Ser Pro Tyr Tyr Ser Thr Ile Lys Ser Lys Asn Leu Thr Val Asn
 405 410 415
 Glu Leu Leu Thr Ile Ala Ser Leu Val Glu Lys Glu Gly Ala Lys Thr
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420

425

430

Glu Asp Arg Lys Leu Ile Ala Gly Val Phe Tyr Asn Arg Leu Asn Arg
 435 440 445

Asp Met Pro Leu Gln Ser Asn Ile Ala Ile Leu Tyr Ala Gln Gly Lys
 450 455 460

Leu Gly Gln Asn Ile Ser Leu Ala Glu Asp Val Ala Ile Asp Thr Asn
 465 470 475 480

Ile Asp Ser Pro Tyr Asn Val Tyr Lys Asn Val Gly Leu Met Pro Gly
 485 490 495

Pro Val Asp Ser Pro Ser Leu Asp Ala Ile Glu Ser Ser Ile Asn Gln
 500 505 510

Thr Lys Ser Asp Asn Leu Tyr Phe Val Ala Asp Val Thr Glu Gly Lys
 515 520 525

Val Tyr Tyr Ala Asn Asn Gln Glu Asp His Asp Arg Asn Val Ala Glu
 530 535 540

His Val Asn Ser Lys Leu Asn
 545 550

<210> 205
 <211> 205
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 205

Met Lys Gln Glu Arg Phe Pro Leu Val Ser Asp Asp Glu Val Met Leu
 1 5 10 15

Thr Glu Met Pro Val Met Asn Leu Tyr Asp Glu Ser Asp Leu Ile Ser
 20 25 30

Asn Ile Lys Gly Glu Tyr Arg Asp Lys Asn Tyr Leu Glu Trp Ala Pro
 35 40 45

Ile Ala Glu Glu Lys Pro Val Lys Pro Ile Glu Lys Gln Val Glu Lys
 50 55 60

Pro Lys Lys Ala Pro Leu Gly Val Lys Lys Glu Gly Lys Ser Tyr Ala
 65 70 75 80

Glu Val Ala Arg Glu Glu Ala Arg Ala Asp Leu Lys Lys Lys Arg Ser
 Page 278

Ala Asn Tyr Leu Thr Gln Asp Phe Ser Leu Ala Arg Arg His Ser Gln
100 105 110

Pro Ser Leu Val Arg Gln Gly Asn Gln Pro Thr Ala Pro Phe Gln Lys
115 120 125

Glu Asn Pro Gly Glu Phe Val Lys Tyr Ser Gln Lys Leu Thr Gln Ser
130 135 140

His Tyr Ile Leu Ala Glu Glu Val His Ser Ile Pro Thr Lys Asn Glu
145 150 155 160

Glu Val Ser Ala Pro Ala Pro Lys Lys Asn Asn Tyr Asp Phe Leu Lys
165 170 175

Lys Ser Gln Ile Tyr Asn Lys Lys Ser Lys Gln Thr Glu Gln Glu Arg
180 185 190

Arg Val Ala Gln Glu Leu Asn Leu Thr Arg Met Thr Glu
195 200 205

<210> 206
<211> 652
<212> PRT
<213> Streptococcus pneumoniae

<400> 206

Met Lys Lys Ser Lys Ser Lys Tyr Leu Thr Leu Ala Gly Leu Val Leu
1 5 10 15

Gly Thr Gly Val Leu Leu Ser Ala Cys Gly Asn Ser Ser Thr Ala Ser
20 25 30

Lys Thr Tyr Asn Tyr Val Tyr Ser Asp Pro Ser Ser Leu Asn Tyr
35 40 45

Leu Ala Glu Asn Arg Ala Ala Thr Ser Asp Ile Val Ala Asn Leu Val
50 55 60

Asp Gly Leu Leu Glu Asn Asp Gln Tyr Gly Asn Ile Ile Pro Ser Leu
65 70 75 80

Ala Glu Asp Trp Thr Val Ser Gln Asp Gly Leu Thr Tyr Thr Tyr Lys
85 90 95

Leu Arg Lys Asp Ala Lys Trp Phe Thr Ser Glu Gly Glu Glu Tyr Ala
279

100

105

110

Pro Val Thr Ala Gln Asp Phe Val Thr Gly Leu Gln Tyr Ala Ala Asp
 115 120 125
 Lys Lys Ser Glu Ala Leu Tyr Leu Val Gln Asp Ser Val Ala Gly Leu
 130 135 140
 Asp Asp Tyr Ile Thr Gly Lys Thr Ser Asp Phe Ser Thr Val Gly Val
 145 150 155 160
 Lys Ala Leu Asp Asp Gln Thr Val Gln Tyr Thr Leu Val Lys Pro Glu
 165 170 175
 Leu Tyr Trp Asn Ser Lys Thr Leu Ala Thr Ile Leu Phe Pro Val Asn
 180 185 190
 Ala Asp Phe Leu Lys Ser Lys Gly Asp Asp Phe Gly Lys Ala Asp Pro
 195 200 205
 Ser Ser Ile Leu Tyr Asn Gly Pro Phe Leu Met Lys Ala Leu Val Ser
 210 215 220
 Lys Ser Ala Ile Glu Tyr Lys Lys Asn Pro Asn Tyr Trp Asp Ala Lys
 225 230 235 240
 Asn Val Phe Val Asp Asp Val Lys Leu Thr Tyr Tyr Asp Gly Ser Asp
 245 250 255
 Gln Glu Ser Leu Glu Arg Asn Phe Thr Ala Gly Ala Tyr Thr Thr Ala
 260 265 270
 Arg Leu Phe Pro Asn Ser Ser Ser Tyr Glu Gly Ile Lys Glu Lys Tyr
 275 280 285
 Lys Asn Asn Ile Ile Tyr Ser Met Gln Asn Ser Thr Ser Tyr Phe Phe
 290 295 300
 Asn Phe Asn Leu Asp Arg Lys Ser Tyr Asn Tyr Thr Ser Lys Thr Ser
 305 310 315 320
 Asp Ile Glu Lys Lys Ser Thr Gln Glu Ala Val Leu Asn Lys Asn Phe
 325 330 335
 Arg Gln Ala Ile Asn Phe Ala Phe Asp Arg Thr Ser Tyr Gly Ala Gln
 340 345 350

1028462_1.TXT

Ser Glu Gly Lys Glu Gly Ala Thr Lys Ile Leu Arg Asn Leu Val Val
 355 360 365
 Pro Pro Asn Phe Val Ser Ile Lys Gly Lys Asp Phe Gly Glu Val Val
 370 375 380
 Ala Ser Lys Met Val Asn Tyr Gly Lys Glu Trp Gln Gly Ile Asn Phe
 385 390 395 400
 Ala Asp Gly Gln Asp Pro Tyr Tyr Asn Pro Glu Lys Ala Lys Ala Lys
 405 410 415
 Phe Ala Glu Ala Lys Lys Glu Leu Glu Ala Lys Gly Val Gln Phe Pro
 420 425 430
 Ile His Leu Asp Lys Thr Val Glu Val Thr Asp Lys Val Gly Ile Gln
 435 440 445
 Gly Val Ser Ser Ile Lys Gln Ser Ile Glu Ser Val Leu Gly Ser Asp
 450 455 460
 Asn Val Val Ile Asp Ile Gln Gln Leu Thr Ser Asp Glu Phe Asp Ser
 465 470 475 480
 Ser Gly Tyr Phe Ala Gln Thr Ala Ala Gln Lys Asp Tyr Asp Leu Tyr
 485 490 495
 His Gly Gly Trp Gly Pro Asp Tyr Gln Asp Pro Ser Thr Tyr Leu Asp
 500 505 510
 Ile Phe Asn Thr Asn Ser Gly Gly Phe Leu Gln Asn Leu Gly Leu Glu
 515 520 525
 Pro Gly Glu Ala Asn Asp Lys Ala Lys Ala Val Gly Leu Asp Val Tyr
 530 535 540
 Thr Gln Met Leu Glu Glu Ala Asn Lys Glu Gln Asp Pro Ala Lys Arg
 545 550 555 560
 Tyr Glu Lys Tyr Ala Asp Ile Gln Ala Trp Leu Ile Asp Ser Ser Leu
 565 570 575
 Val Leu Pro Ser Val Ser Arg Gly Gly Thr Pro Ser Leu Arg Arg Thr
 580 585 590
 Val Pro Phe Ala Ala Ala Tyr Gly Leu Thr Gly Thr Lys Gly Val Glu
 595 600 605

1028462_1.TXT

Ser Tyr Lys Tyr Leu Lys Val Gln Asp Lys Ile Val Thr Thr Asp Glu
610 615 620

Tyr Ala Lys Ala Arg Glu Lys Trp Leu Lys Glu Lys Glu Glu Ser Asn
625 630 635 640

Lys Lys Ala Gln Glu Glu Leu Ala Lys His Val Lys
645 650

<210> 207
<211> 506
<212> PRT
<213> Streptococcus pneumoniae

<400> 207

Val Glu Gln His Ser Asp Val Cys Tyr Ile Phe Tyr Arg Arg Glu Arg
1 5 10 15

Leu Lys Thr Lys Ile Gly Leu Ala Ser Ile Cys Leu Leu Gly Leu Ala
20 25 30

Thr Ser His Val Ala Ala Asn Glu Thr Glu Val Ala Lys Thr Ser Gln
35 40 45

Asp Thr Thr Thr Ala Ser Ser Ser Ser Glu Gln Asn Gln Ser Ser Asn
50 55 60

Lys Thr Gln Thr Ser Ala Glu Val Gln Thr Asn Ala Ala Ala His Trp
65 70 75 80

Asp Gly Asp Tyr Tyr Val Lys Asp Asp Gly Ser Lys Ala Gln Ser Glu
85 90 95

Trp Ile Phe Asp Asn Tyr Tyr Lys Ala Trp Phe Tyr Ile Asn Ser Asp
100 105 110

Gly Arg Tyr Ser Gln Asn Glu Trp His Gly Asn Tyr Tyr Leu Lys Ser
115 120 125

Gly Gly Tyr Met Ala Gln Asn Glu Trp Ile Tyr Asp Ser Asn Tyr Lys
130 135 140

Ser Trp Phe Tyr Leu Lys Ser Asp Gly Ala Tyr Ala His Gln Glu Trp
145 150 155 160

Gln Leu Ile Gly Asn Lys Trp Tyr Tyr Phe Lys Lys Trp Gly Tyr Met
165 170 175

1028462_1.TXT

Ala Lys Ser Gln Trp Gln Gly Ser Tyr Phe Leu Asn Gly Gln Gly Ala
 180 185 190
 Met Met Gln Asn Glu Trp Leu Tyr Asp Pro Ala Tyr Ser Ala Tyr Phe
 195 200 205
 Tyr Leu Lys Ser Asp Gly Thr Tyr Ala Asn Gln Glu Trp Gln Lys Val
 210 215 220
 Gly Gly Lys Trp Tyr Tyr Phe Lys Lys Trp Gly Tyr Met Ala Arg Asn
 225 230 235 240
 Glu Trp Gln Gly Asn Tyr Tyr Leu Thr Gly Ser Gly Ala Met Ala Thr
 245 250 255
 Asp Glu Val Ile Met Asp Gly Thr Arg Tyr Ile Phe Ala Ala Ser Gly
 260 265 270
 Glu Leu Lys Glu Lys Lys Asp Leu Asn Val Gly Trp Val His Arg Asp
 275 280 285
 Gly Lys Arg Tyr Phe Phe Asn Asn Arg Glu Glu Gln Val Gly Thr Glu
 290 295 300
 His Ala Lys Lys Val Ile Asp Ile Ser Glu His Asn Gly Arg Ile Asn
 305 310 315 320
 Asp Trp Lys Lys Val Ile Asp Glu Asn Glu Val Asp Gly Val Ile Val
 325 330 335
 Arg Leu Gly Tyr Ser Gly Lys Glu Asp Lys Glu Leu Ala His Asn Ile
 340 345 350
 Lys Glu Leu Asn Arg Leu Gly Ile Pro Tyr Gly Val Tyr Leu Tyr Thr
 355 360 365
 Tyr Ala Glu Asn Glu Thr Asp Ala Glu Ser Asp Ala Lys Gln Thr Ile
 370 375 380
 Glu Leu Ile Lys Lys Tyr Asn Met Asn Leu Ser Tyr Pro Ile Tyr Tyr
 385 390 395 400
 Asp Val Glu Asn Trp Glu Tyr Val Asn Lys Ser Lys Arg Ala Pro Ser
 405 410 415
 Asp Thr Gly Thr Trp Val Lys Ile Ile Asn Lys Tyr Met Asp Thr Met
 420 425 430

1028462_1.TXT

Lys Gln Ala Gly Tyr Gln Asn Val Tyr Val Tyr Ser Tyr Arg Ser Leu
435 440 445

Leu Gln Thr Arg Leu Lys His Pro Asp Ile Leu Lys His Val Asn Trp
450 455 460

Val Ala Ala Tyr Thr Asn Ala Leu Glu Trp Glu Asn Pro His Tyr Ser
465 470 475 480

Gly Lys Lys Gly Trp Gln Tyr Thr Ser Ser Glu Tyr Met Lys Gly Ile
485 490 495

Gln Gly Arg Val Asp Val Ser Val Trp Tyr
500 505

<210> 208
<211> 158
<212> PRT
<213> Streptococcus pneumoniae
<400> 208

Met Ala Lys Glu Pro Trp Gln Glu Asp Ile Tyr Asp Gln Glu Glu Ser
1 5 10 15

Arg Ala Glu Arg Arg His Arg Asn His Gly Gly Ala Asp Arg Met Ala
20 25 30

Asn Arg Ile Leu Thr Ile Leu Ala Ser Ile Phe Phe Val Ile Val Val
35 40 45

Val Met Val Ile Val Leu Ile Tyr Leu Ser Ser Gly Gly Ser Asn Arg
50 55 60

Thr Ala Ala Leu Lys Gly Phe His Asp Ser Asp Ala Ser Val Val Gln
65 70 75 80

Ile Ser Ser Ser Ser Ser Ser Gln Pro Glu Gln Ser Ser Glu Pro Glu
85 90 95

Ser Thr Ser Ser Ser Ser Glu Glu Ala Ala Asn Pro Glu Gly Thr Ile
100 105 110

Lys Val Leu Ala Gly Glu Gly Glu Ala Ala Ile Ala Ala Arg Ala Gly
115 120 125

Ile Ser Ile Ala Gln Leu Glu Ala Leu Asn Pro Gly His Met Ala Thr
130 135 140

1028462_1.TXT

Gly Ser Trp Phe Ala Asn Pro Gly Asp Val Ile Lys Ile Lys
 145 150 155

<210> 209
 <211> 262
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 209

Met Pro Ile Thr Ser Leu Glu Ile Lys Asp Lys Thr Phe Gly Thr Arg
 1 5 10 15

Phe Arg Gly Phe Asp Pro Glu Glu Val Asp Glu Phe Leu Asp Ile Val
 20 25 30

Val Arg Asp Tyr Glu Asp Leu Val Arg Ala Asn His Asp Lys Asn Leu
 35 40 45

Arg Ile Lys Ser Leu Glu Glu Arg Leu Ser Tyr Phe Asp Glu Ile Lys
 50 55 60

Asp Ser Leu Ser Gln Ser Val Leu Ile Ala Gln Asp Thr Ala Glu Arg
 65 70 75 80

Val Lys Gln Ala Ala His Glu Arg Ser Asn Asn Ile Ile His Gln Ala
 85 90 95

Glu Gln Asp Ala Gln Arg Leu Leu Glu Glu Ala Lys Tyr Lys Ala Asn
 100 105 110

Glu Ile Leu Arg Gln Ala Thr Asp Asn Ala Lys Lys Val Ala Val Glu
 115 120 125

Thr Glu Glu Leu Lys Asn Lys Ser Arg Val Phe His Gln Arg Leu Lys
 130 135 140

Ser Thr Ile Glu Ser Gln Leu Ala Ile Val Glu Ser Ser Asp Trp Glu
 145 150 155 160

Asp Ile Leu Arg Pro Thr Ala Thr Tyr Leu Gln Thr Ser Asp Glu Ala
 165 170 175

Phe Lys Glu Val Val Ser Glu Val Leu Gly Glu Pro Ile Pro Ala Pro
 180 185 190

Ile Glu Glu Glu Pro Ile Asp Met Thr Arg Gln Phe Ser Gln Ala Glu
 195 200 205

1028462_1.TXT

Met Ala Glu Leu Gln Ala Arg Ile Glu Val Ala Asp Lys Glu Leu Ser
210 215 220

Glu Phe Glu Ala Gln Ile Lys Gln Glu Val Glu Ala Pro Thr Pro Val
225 230 235 240

Val Ser Pro Gln Val Glu Glu Glu Pro Leu Leu Ile Gln Leu Ala Gln
245 250 255

Cys Met Lys Asn Gln Lys
260

<210> 210
<211> 179
<212> PRT
<213> Streptococcus pneumoniae

<400> 210

Met Ser Leu Lys Asp Arg Phe Asp Arg Phe Ile Asp Tyr Phe Thr Glu
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Asp Glu Asp Ser Ser Leu Pro Tyr Glu Lys Arg Asp Glu Pro Val Phe
20 25 30

Thr Ser Val Asn Ser Ser Gln Glu Pro Ala Leu Pro Met Asn Gln Pro
35 40 45

Ser Gln Ser Ala Gly Thr Lys Glu Asn Asn Ile Thr Arg Leu His Ala
50 55 60

Arg Gln Gln Glu Leu Ala Asn Gln Ser Gln Arg Ala Thr Asp Lys Val
65 70 75 80

Ile Ile Asp Val Arg Tyr Pro Arg Lys Tyr Glu Asp Ala Thr Glu Ile
85 90 95

Val Asp Leu Leu Ala Gly Asn Glu Ser Ile Leu Ile Asp Phe Gln Tyr
100 105 110

Met Thr Glu Val Gln Ala Arg Arg Cys Leu Asp Tyr Leu Asp Gly Ala
115 120 125

Cys His Val Leu Ala Gly Asn Leu Lys Lys Val Ala Ser Thr Met Tyr
130 135 140

Leu Leu Thr Pro Val Asn Val Ile Val Asn Val Glu Asp Ile Arg Leu
145 150 155 160

1028462_1.TXT

Pro Asp Glu Asp Gln Gln Gly Glu Phe Gly Phe Asp Met Lys Arg Asn
165 170 175

Arg Val Arg

<210> 211
<211> 305
<212> PRT
<213> Streptococcus pneumoniae

<400> 211

Met Ser Asp Leu Lys Lys Tyr Glu Gly Val Ile Pro Ala Phe Tyr Ala
1 5 10 15

Cys Tyr Asp Asp Gln Gly Glu Val Ser Pro Glu Arg Thr Arg Ala Leu
20 25 30

Val Gln Tyr Phe Ile Asp Lys Gly Val Gln Gly Leu Tyr Val Asn Gly
35 40 45

Ser Ser Gly Glu Cys Ile Tyr Gln Ser Val Glu Asp Arg Lys Leu Ile
50 55 60

Leu Glu Glu Val Met Ala Val Ala Lys Gly Lys Leu Thr Ile Ile Ala
65 70 75 80

His Val Ala Cys Asn Asn Thr Lys Asp Ser Met Glu Leu Ala Arg His
85 90 95

Ala Glu Ser Leu Gly Val Asp Ala Ile Ala Thr Ile Pro Pro Ile Tyr
100 105 110

Phe Arg Leu Pro Glu Tyr Ser Val Ala Lys Tyr Trp Asn Asp Ile Ser
115 120 125

Ser Ala Ala Pro Asn Thr Asp Tyr Val Ile Tyr Asn Ile Pro Gln Leu
130 135 140

Ala Gly Val Ala Leu Thr Pro Ser Leu Tyr Thr Glu Met Leu Lys Asn
145 150 155 160

Pro Arg Val Ile Gly Val Lys Asn Ser Ser Met Pro Val Gln Asp Ile
165 170 175

Gln Thr Phe Val Ser Leu Gly Gly Glu Asp His Ile Val Phe Asn Gly
180 185 190

1028462_1.TXT

Pro Asp Glu Gln Phe Leu Gly Gly Arg Leu Met Gly Ala Arg Ala Gly
195 200 205

Ile Gly Gly Thr Tyr Gly Ala Met Pro Glu Leu Phe Leu Lys Leu Asn
210 215 220

Gln Leu Ile Ala Asp Lys Asp Leu Glu Thr Ala Arg Glu Leu Gln Tyr
225 230 235 240

Ala Ile Asn Ala Ile Ile Gly Lys Leu Thr Ser Ala His Gly Asn Met
245 250 255

Tyr Gly Val Ile Lys Glu Val Leu Lys Ile Asn Glu Gly Leu Asn Ile
260 265 270

Gly Ser Val Arg Ser Pro Leu Thr Pro Val Thr Glu Glu Asp Arg Pro
275 280 285

Val Val Glu Ala Ala Ala Ala Leu Ile Arg Glu Thr Lys Glu Arg Phe
290 295 300

Leu
305

<210> 212
<211> 697
<212> PRT
<213> Streptococcus pneumoniae

<400> 212

Met Asn Lys Arg Gly Leu Tyr Ser Lys Leu Gly Ile Ser Val Val Gly
1 5 10 15

Ile Ser Leu Leu Met Gly Val Pro Thr Leu Ile His Ala Asn Glu Leu
20 25 30

Asn Tyr Gly Gln Leu Ser Ile Ser Pro Ile Phe Gln Gly Gly Ser Tyr
35 40 45

Gln Leu Asn Asn Lys Ser Ile Asp Ile Ser Ser Leu Leu Leu Asp Lys
50 55 60

Leu Ser Gly Glu Ser Gln Thr Val Val Met Lys Phe Lys Ala Asp Lys
65 70 75 80

Pro Asn Ser Leu Gln Ala Leu Phe Gly Leu Ser Asn Ser Lys Ala Gly
85 90 95

1028462_1.TXT

Phe Lys Asn Asn Tyr Phe Ser Ile Phe Met Arg Asp Ser Gly Glu Ile
 100 105 110
 Gly Val Glu Ile Arg Asp Ala Gln Lys Gly Ile Asn Tyr Leu Phe Ser
 115 120 125
 Arg Pro Ala Ser Leu Trp Gly Lys His Lys Gly Gln Ala Val Glu Asn
 130 135 140
 Thr Leu Val Phe Val Ser Asp Ser Lys Asp Lys Thr Tyr Thr Met Tyr
 145 150 155 160
 Val Asn Gly Ile Glu Val Phe Ser Glu Thr Val Asp Thr Phe Leu Pro
 165 170 175
 Ile Ser Asn Ile Asn Gly Ile Asp Lys Ala Thr Leu Gly Ala Val Asn
 180 185 190
 Arg Glu Gly Lys Glu His Tyr Leu Ala Lys Gly Ser Ile Asp Glu Ile
 195 200 205
 Ser Leu Phe Asn Lys Ala Ile Ser Asp Gln Glu Val Ser Thr Ile Pro
 210 215 220
 Leu Ser Asn Pro Phe Gln Leu Ile Phe Gln Ser Gly Asp Ser Thr Gln
 225 230 235 240
 Ala Asn Tyr Phe Arg Ile Pro Thr Leu Tyr Thr Leu Ser Ser Gly Arg
 245 250 255
 Val Leu Ser Ser Ile Asp Ala Arg Tyr Gly Gly Thr His Asp Ser Lys
 260 265 270
 Ser Lys Ile Asn Ile Ala Thr Ser Tyr Ser Asp Asp Asn Gly Lys Thr
 275 280 285
 Trp Ser Glu Pro Ile Phe Ala Met Lys Phe Asn Asp Tyr Glu Glu Gln
 290 295 300
 Leu Val Tyr Trp Pro Arg Asp Asn Lys Leu Lys Asn Ser Gln Ile Ser
 305 310 315 320
 Gly Ser Ala Ser Phe Ile Asp Ser Ser Ile Val Glu Asp Lys Lys Ser
 325 330 335
 Gly Lys Thr Ile Leu Leu Ala Asp Val Met Pro Ala Gly Ile Gly Asn
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340                                     345                                     350
Asn Asn Ala Asn Lys Ala Asp Ser Gly Phe Lys Glu Ile Asn Gly His
355                                     360
Tyr Tyr Leu Lys Leu Lys Lys Asn Gly Asp Asn Asp Phe Arg Tyr Thr
370                                     375
Val Arg Glu Asn Gly Val Val Tyr Asn Glu Thr Thr Asn Lys Pro Thr
385                                     390                                     395
Asn Tyr Thr Ile Asn Asp Lys Tyr Glu Val Leu Glu Gly Gly Lys Ser
405                                     410                                     415
Leu Thr Val Glu Gln Tyr Ser Val Asp Phe Asp Ser Gly Ser Leu Arg
420                                     425
Glu Arg His Asn Gly Lys Gln Val Pro Met Asn Val Phe Tyr Lys Asp
435                                     440                                     445
Ser Leu Phe Lys Val Thr Pro Thr Asn Tyr Ile Ala Met Thr Thr Ser
450                                     455                                     460
Gln Asn Arg Gly Glu Ser Trp Glu Gln Phe Lys Leu Leu Pro Pro Phe
465                                     470                                     475
Leu Gly Glu Lys His Asn Gly Thr Tyr Leu Cys Pro Gly Gln Gly Leu
485                                     490                                     495
Ala Leu Lys Ser Ser Asn Arg Leu Ile Phe Ala Thr Tyr Thr Ser Gly
500                                     505                                     510
Glu Leu Thr Tyr Leu Ile Ser Asp Asp Ser Gly Gln Thr Trp Lys Lys
515                                     520                                     525
Ser Ser Ala Ser Ile Pro Phe Lys Asn Ala Thr Ala Glu Ala Gln Met
530                                     535                                     540
Val Glu Leu Arg Asp Gly Val Ile Arg Thr Phe Phe Arg Thr Thr Thr
545                                     550                                     555                                     560
Gly Lys Ile Ala Tyr Met Thr Ser Arg Asp Ser Gly Glu Thr Trp Ser
565                                     570                                     575
Lys Val Ser Tyr Ile Asp Gly Ile Gln Gln Thr Ser Tyr Gly Thr Gln
580                                     585                                     590

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1028462_1.TXT

Val Ser Ala Ile Lys Tyr Ser Gln Leu Ile Asp Gly Lys Glu Ala Val
 595 600 605

Ile Leu Ser Thr Pro Asn Ser Arg Ser Gly Arg Lys Gly Gly Gln Leu
 610 615 620

Val Val Gly Leu Val Asn Lys Glu Asp Asp Ser Ile Asp Trp Lys Tyr
 625 630 635 640

His Tyr Asp Ile Asp Leu Pro Ser Tyr Gly Tyr Ala Tyr Ser Ala Ile
 645 650 655

Thr Glu Leu Pro Asn His His Ile Gly Val Leu Phe Glu Lys Tyr Asp
 660 665 670

Ser Trp Ser Arg Asn Glu Leu His Leu Ser Asn Val Val Gln Tyr Ile
 675 680 685

Asp Leu Glu Ile Asn Asp Leu Thr Lys
 690 695

<210> 213

<211> 946

<212> PRT

<213> Streptococcus pneumoniae

<400> 213

Met Asn Arg Ser Val Gln Glu Arg Lys Cys Arg Tyr Ser Ile Arg Lys
 1 5 10 15

Leu Ser Val Gly Ala Val Ser Met Ile Val Gly Ala Val Val Phe Gly
 20 25 30

Thr Ser Pro Val Leu Ala Gln Glu Gly Ala Ser Glu Gln Pro Leu Ala
 35 40 45

Asn Glu Thr Gln Leu Ser Gly Glu Ser Ser Thr Leu Thr Asp Thr Glu
 50 55 60

Lys Ser Gln Pro Ser Ser Glu Thr Glu Leu Ser Gly Asn Lys Gln Glu
 65 70 75 80

Gln Glu Arg Lys Asp Lys Gln Glu Glu Lys Ile Pro Arg Asp Tyr Tyr
 85 90 95

Ala Arg Asp Leu Glu Asn Val Glu Thr Val Ile Glu Lys Glu Asp Val
 100 105 110

1028462_1.TXT

Glu Thr Asn Ala Ser Asn Gly Gln Arg Val Asp Leu Ser Ser Glu Leu
 115 120 125
 Asp Lys Leu Lys Lys Leu Glu Asn Ala Thr Val His Met Glu Phe Lys
 130 135 140
 Pro Asp Ala Lys Ala Pro Ala Phe Tyr Asn Leu Phe Ser Val Ser Ser
 145 150 155 160
 Ala Thr Lys Lys Asp Glu Tyr Phe Thr Met Ala Val Tyr Asn Asn Thr
 165 170 175
 Ala Thr Leu Glu Gly Arg Gly Ser Asp Gly Lys Gln Phe Tyr Asn Asn
 180 185 190
 Tyr Asn Asp Ala Pro Leu Lys Val Lys Pro Gly Gln Trp Asn Ser Val
 195 200 205
 Thr Phe Thr Val Glu Lys Pro Thr Ala Glu Leu Pro Lys Gly Arg Val
 210 215 220
 Arg Leu Tyr Val Asn Gly Val Leu Ser Arg Thr Ser Leu Arg Ser Gly
 225 230 235 240
 Asn Phe Ile Lys Asp Met Pro Asp Val Thr His Val Gln Ile Gly Ala
 245 250 255
 Thr Lys Arg Ala Asn Asn Thr Val Trp Gly Ser Asn Leu Gln Ile Arg
 260 265 270
 Asn Leu Thr Val Tyr Asn Arg Ala Leu Thr Pro Glu Glu Val Gln Lys
 275 280 285
 Arg Ser Gln Leu Phe Lys Arg Ser Asp Leu Glu Lys Lys Leu Pro Glu
 290 295 300
 Gly Ala Ala Leu Thr Glu Lys Thr Asp Ile Phe Glu Ser Gly Arg Asn
 305 310 315 320
 Gly Asn Pro Asn Lys Asp Gly Ile Lys Ser Tyr Arg Ile Pro Ala Leu
 325 330 335
 Leu Lys Thr Asp Lys Gly Thr Leu Ile Ala Gly Ala Asp Glu Arg Arg
 340 345 350
 Leu His Ser Ser Asp Trp Gly Asp Ile Gly Met Val Ile Arg Arg Ser
 355 360 365

1028462_1.TXT

Glu Asp Asn Gly Lys Thr Trp Gly Asp Arg Val Thr Ile Thr Asn Leu
 370 375 380
 Arg Asp Asn Pro Lys Ala Ser Asp Pro Ser Ile Gly Ser Pro Val Asn
 385 390 395 400
 Ile Asp Met Val Leu Val Gln Asp Pro Glu Thr Lys Arg Ile Phe Ser
 405 410 415
 Ile Tyr Asp Met Phe Pro Glu Gly Lys Gly Ile Phe Gly Met Ser Ser
 420 425 430
 Gln Lys Glu Glu Ala Tyr Lys Lys Ile Asp Gly Lys Thr Tyr Gln Ile
 435 440 445
 Leu Tyr Arg Glu Gly Glu Lys Gly Ala Tyr Thr Ile Arg Glu Asn Gly
 450 455 460
 Thr Val Tyr Thr Pro Asp Gly Lys Ala Thr Asp Tyr Arg Val Val Val
 465 470 475 480
 Asp Pro Val Lys Pro Ala Tyr Ser Asp Lys Gly Asp Leu Tyr Lys Gly
 485 490 495
 Asp Gln Leu Leu Gly Asn Ile Tyr Phe Thr Thr Asn Lys Thr Ser Pro
 500 505 510
 Phe Arg Ile Ala Lys Asp Ser Tyr Leu Trp Met Ser Tyr Ser Asp Asp
 515 520 525
 Asp Gly Lys Thr Trp Ser Ala Pro Gln Asp Ile Thr Pro Met Val Lys
 530 535 540
 Ala Asp Trp Met Lys Phe Leu Gly Val Gly Pro Gly Thr Gly Ile Val
 545 550 555 560
 Leu Arg Asn Gly Pro His Lys Gly Arg Ile Leu Ile Pro Val Tyr Thr
 565 570 575
 Thr Asn Asn Val Ser His Leu Asp Gly Ser Gln Ser Ser Arg Val Ile
 580 585 590
 Tyr Ser Asp Asp His Gly Lys Thr Trp His Ala Gly Glu Ala Val Asn
 595 600 605
 Asp Asn Arg Gln Val Asp Gly Gln Lys Ile His Ser Ser Thr Met Asn
 610 615 620

1028462_1.TXT

Asn Arg Arg Ala Gln Asn Thr Glu Ser Thr Val Val Gln Leu Asn Asn
 625 630 635 640
 Gly Asp Val Lys Leu Phe Met Arg Gly Leu Thr Gly Asp Leu Gln Val
 645 650 655
 Ala Thr Ser Lys Asp Gly Gly Val Thr Trp Glu Lys Asp Ile Lys Arg
 660 665 670
 Tyr Pro Gln Val Lys Asp Val Tyr Val Gln Met Ser Ala Ile His Thr
 675 680 685
 Met His Glu Gly Lys Glu Tyr Ile Ile Leu Ser Asn Ala Gly Gly Pro
 690 695 700
 Lys Arg Glu Asn Gly Met Val His Leu Ala Arg Val Glu Glu Asn Gly
 705 710 715 720
 Glu Leu Thr Trp Leu Lys His Asn Pro Ile Gln Lys Gly Glu Phe Ala
 725 730 735
 Tyr Asn Ser Leu Gln Glu Leu Gly Asn Gly Glu Tyr Gly Ile Leu Tyr
 740 745 750
 Glu His Thr Glu Lys Gly Gln Asn Ala Tyr Thr Leu Ser Phe Arg Lys
 755 760 765
 Phe Asn Trp Glu Phe Leu Ser Lys Asn Leu Ile Ser Pro Thr Glu Ala
 770 775 780
 Asn Arg Asp Gly Gln Arg Arg Asp Gly Gln Arg Ser Tyr Trp Leu Gly
 785 790 795 800
 Val Arg Leu Arg Ser Ile Gly Gln Gln Gly Ser Asn Pro Ser Ile Gly
 805 810 815
 Lys Trp Asn Ser Asp Phe Pro Asn Pro Val Gln Asp Leu Val Val Cys
 820 825 830
 Ser Arg Gly Arg Tyr Arg Thr Gly Asn Tyr Trp Tyr Ser Arg Lys His
 835 840 845
 Arg Lys Tyr Ala Ser Ser Cys Lys Ser Ser Arg Cys Gln Ser Ser Trp
 850 855 860
 Arg Ser Lys Trp Gln Ser Ser Gly Ala Ser Ser Arg Ile Tyr Arg Gly

865

870

875

880

Ser Trp Tyr Arg Ala Ser Cys Ser Asn Arg Arg Val Gly Ile Phe Ala
 885 890

Cys Asn Ser Tyr Tyr Lys Lys Arg Leu Tyr Leu Gln Ser Ser Cys
 900 905 910

Ser Ala Gly Thr Ser Asn Arg Lys Gln Gly Glu Pro Pro Ser Phe Thr
 915 920 925

Arg Thr Asn Ser Phe Leu Pro Trp Ser Val Tyr Ala Arg Glu Lys Glu
 930 935 940

Arg Thr
 945

<210> 214

<211> 659

<212> PRT

<213> Streptococcus pneumoniae

<400> 214

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys
 1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu
 20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr
 35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala
 50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly
 65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu
 85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu
 100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His
 115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu
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130

135

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser
260 265 270

Leu Ser Tyr Asn Arg Arg Asn Glu Ser Lys Leu Ile Phe Asp Glu Thr
275 280 285

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala
355 360 365

Thr Ile Ala Ile Pro Asp Val Ala Gly Gln Thr Val Ala Glu Ala Lys
370 375 380

1028462_1.TXT

Ala Thr Leu Lys Lys Ala Asn Phe Glu Ile Gly Glu Glu Lys Thr Glu
385 390 395 400

Ala Ser Glu Lys Val Glu Glu Gly Arg Ile Ile Arg Thr Asp Pro Gly
405 410 415

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser
435 440 445

Ser Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu
450 455 460

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu
625 630 635 640

1028462_1.TXT

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser
645 650 655

Ala Thr Pro

<210> 215
<211> 311
<212> PRT
<213> Streptococcus pneumoniae

<400> 215

Met Thr Lys Leu Ile Phe Met Gly Thr Pro Asp Phe Ser Ala Thr Val
1 5 10 15

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 Page 301

595

600

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 3665 3670 3675
 Glu Ser Ala Ser Thr Ser Ala Ser Ala Ser Thr Ser Ala
 3680 3685 3690
 Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Thr Ser
 3695 3700 3705
 Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Thr
 3710 3715 3720
 Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Thr Ser Ala Ser
 3725 3730 3735
 Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Glu Ser Ala
 3740 3745 3750
 Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Thr Ser Ala Ser
 3755 3760 3765
 Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Thr Ser Ala
 3770 3775 3780
 Ser Ala Ser Thr Ser Ala Ser Val Ser Ala Ser Thr Ser Ala Ser
 3785 3790 3795
 Glu Ser Ala Ser Thr Ser Ala Ser Ala Ser Thr Ser Thr Ser Ala
 3800 3805 3810
 Ser Ala Ser Ala Ser Thr Ser Ala Ser Glu Ser Thr Ser Thr Ser
 3815 3820 3825
 Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Glu Ser Thr Ser Thr
 3830 3835 3840
 Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Thr Ser Ala Ser
 3845 3850 3855
 Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Thr Ser Ala
 318

3860

3865

3870

Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser
 3875 3880 3885
 Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala
 3890 3895 3900
 Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser
 3905 3910 3915
 Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala
 3920 3925 3930
 Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Ile Ser
 3935 3940 3945
 Ala Ser Glu Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr
 3950 3955 3960
 Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Val Ser Ala Ser
 3965 3970 3975
 Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala
 3980 3985 3990
 Ser Ile Ser Ala Ser Glu Ser Ala Ser Thr Ser Ala Ser Ala Ser
 3995 4000 4005
 Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala
 4010 4015 4020
 Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Ile Ser Ala Ser
 4025 4030 4035
 Glu Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala
 4040 4045 4050
 Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser
 4055 4060 4065
 Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr
 4070 4075 4080
 Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser
 4085 4090 4095

1028462_1.TXT

Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala
 4100 4105 4110
 Ser Thr Ser Ala Ser Glu Ser Ala Ser Thr Ser Ala Ser Ala Ser
 4115 4120 4125
 Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Ile Ser Ala Ser Glu
 4130 4135 4140
 Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser
 4145 4150 4155
 Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala
 4160 4165 4170
 Ser Glu Ser Ala Ser Thr Ser Thr Ser Ala Ser Ala Ser Thr Ser
 4175 4180 4185
 Ala Ser Glu Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr
 4190 4195 4200
 Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser
 4205 4210 4215
 Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Thr
 4220 4225 4230
 Ser Ala Ser Glu Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser
 4235 4240 4245
 Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala
 4250 4255 4260
 Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser
 4265 4270 4275
 Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala
 4280 4285 4290
 Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser
 4295 4300 4305
 Glu Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala
 4310 4315 4320
 Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser
 4325 4330 4335

1028462_1.TXT

Ala Ser 4340 Ala Ser Ala Ser Thr 4345 Ser Ala Ser Val Ser 4350 Ala Ser Thr
 Ser Ala 4355 Ser Glu Ser Ala Ser Thr 4360 Thr Ser Ala Ser Ala 4365 Ser Ala Ser
 Thr Ser 4370 Ala Ser Ala Ser Ala 4375 Ser Thr Ser Ala Ser 4380 Glu Ser Ala
 Ser Thr 4385 Ser Ala Ser Ala Ser 4390 Ala Ser Thr Ser Ala 4395 Ser Glu Ser
 Ala Ser 4400 Thr Ser Ala Ser Ala 4405 Ser Ala Ser Thr Ser 4410 Ala Ser Ala
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 Ala Ser 4430 Ala Ser Thr Ser Ala 4435 Ser Ala Ser Ala Ser 4440 Thr Ser Ala
 Ser Ala 4445 Ser Ala Ser Thr Ser 4450 Ala Ser Ala Ser Ala 4455 Ser Thr Ser
 Ala Ser 4460 Ala Ser Ala Ser Thr 4465 Ser Ala Ser Ala Ser 4470 Ala Ser Thr
 Ser Ala 4475 Ser Ala Ser Ala Ser 4480 Thr Ser Ala Ser Ala 4485 Ser Ala Ser
 Thr Ser 4490 Ala Ser Ala Ser Ala 4495 Ser Thr Ser Ala Ser 4500 Ala Ser Ala
 Ser Ile 4505 Ser Ala Ser Glu Ser 4510 Ala Ser Thr Ser Ala 4515 Ser Ala Ser
 Ala Ser 4520 Thr Ser Ala Ser Ala 4525 Ser Ala Ser Thr Ser 4530 Ala Ser Val
 Ser Ala 4535 Ser Thr Ser Ala Ser 4540 Ala Ser Ala Ser Thr 4545 Ser Ala Ser
 Ala Ser 4550 Ala Ser Ile Ser Ala 4555 Ser Glu Ser Ala Ser 4560 Thr Ser Ala
 Ser Ala 4565 Ser Ala Ser Thr Ser 4570 Ala Ser Ala Ser Ala 4575 Ser Thr Ser

1028462_1.TXT

Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Ile
 4580 4585 4590
 Ser Ala Ser Glu Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser
 4595 4600 4605
 Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala
 4610 4615 4620
 Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser
 4625 4630 4635
 Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala
 4640 4645 4650
 Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser
 4655 4660 4665
 Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser Ala
 4670 4675 4680
 Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr Ser
 4685 4690 4695
 Ala Ser Ala Ser Ala Ser Thr Ser Ala Ser Ala Ser Ala Ser Thr
 4700 4705 4710
 Ser Val Ser Asn Ser Ala Asn His Ser Asn Ser Gln Val Gly Asn
 4715 4720 4725
 Thr Ser Gly Ser Thr Gly Lys Ser Gln Lys Glu Leu Pro Asn Thr
 4730 4735 4740
 Gly Thr Glu Ser Ser Ile Gly Ser Val Leu Leu Gly Val Leu Ala
 4745 4750 4755
 Ala Val Thr Gly Ile Gly Leu Val Ala Lys Arg Arg Lys Arg Asp
 4760 4765 4770
 Glu Glu Glu
 4775

<210> 218
 <211> 202
 <212> PRT
 <213> Streptococcus pneumoniae

1028462_1.TXT

<400> 218

Met Ser Asn Glu Lys Asn Thr Asn Thr Asn Val Glu Lys Lys Asp Ala
 1 5 10 15
 Thr Val Val Ala His Glu Ile Lys Gly Glu Leu Thr Tyr Glu Asp Lys
 20 25 30
 Val Ile Gln Lys Ile Ile Gly Leu Ser Leu Glu Asn Val Ser Gly Leu
 35 40 45
 Leu Gly Ile Asp Gly Gly Phe Phe Ser Asn Leu Lys Glu Lys Ile Val
 50 55 60
 Asn Ser Asp Asp Val Thr Ser Gly Val Asn Val Glu Val Gly Lys Thr
 65 70 75 80
 Gln Val Ala Val Asp Leu Asn Val Ile Val Glu Tyr Gln Lys Asn Val
 85 90 95
 Pro Ala Leu Tyr Ser Glu Ile Arg Glu Ile Val Ser Ser Glu Val Ala
 100 105 110
 Lys Met Thr Asp Leu Glu Ile Val Glu Ile Asn Val Asn Val Val Asp
 115 120 125
 Ile Lys Thr Lys Glu Gln His Glu Ala Asp Ser Val Ser Leu Gln Asp
 130 135 140
 Arg Val Ser Asp Val Ala Glu Ser Thr Gly Glu Phe Thr Ser Glu Gln
 145 150 155 160
 Phe Glu Lys Ala Lys Ser Gly Leu Gly Ser Gly Phe Ser Thr Val Gln
 165 170 175
 Glu Lys Val Ser Glu Gly Val Glu Ala Val Lys Gly Ala Ala Asn Gly
 180 185 190
 Val Val Ser His Glu Asn Thr Arg Val Asn
 195 200

<210> 219

<211> 355

<212> PRT

<213> Streptococcus pneumoniae

<400> 219

Met Thr Lys Glu Lys Asn Val Ile Leu Thr Ala Arg Asp Ile Val Val
 1 5 10 15

1028462_1.TXT

Glu Phe Asp Val Arg Asp Lys Val Leu Thr Ala Ile Arg Gly Val Ser
 20 25 30
 Leu Glu Leu Val Glu Gly Glu Val Leu Ala Leu Val Gly Glu Ser Gly
 35 40 45
 Ser Gly Lys Ser Val Leu Thr Lys Thr Phe Thr Gly Met Leu Glu Glu
 50 55 60
 Asn Gly Arg Ile Ala Gln Gly Ser Ile Asp Tyr Arg Gly Gln Asp Leu
 65 70 75 80
 Thr Ala Leu Ser Ser His Lys Asp Trp Glu Gln Ile Arg Gly Ala Lys
 85 90 95
 Ile Ala Thr Ile Phe Gln Asp Pro Met Thr Ser Leu Asp Pro Ile Lys
 100 105 110
 Thr Ile Gly Ser Gln Ile Thr Glu Val Ile Val Lys His Gln Gly Lys
 115 120 125
 Thr Ala Lys Glu Ala Lys Glu Leu Ala Ile Asp Tyr Met Asn Lys Val
 130 135 140
 Gly Ile Pro Asp Ala Asp Arg Arg Phe Asn Glu Tyr Pro Phe Gln Tyr
 145 150 155 160
 Ser Gly Gly Met Arg Gln Arg Ile Val Ile Ala Ile Ala Leu Ala Cys
 165 170 175
 Arg Pro Asp Val Leu Ile Cys Asp Glu Pro Thr Thr Ala Leu Asp Val
 180 185 190
 Thr Ile Gln Ala Gln Ile Ile Asp Leu Leu Lys Ser Leu Gln Asn Glu
 195 200 205
 Tyr His Phe Thr Thr Ile Phe Ile Thr His Asp Leu Gly Val Val Ala
 210 215 220
 Ser Ile Ala Asp Lys Val Ala Val Met Tyr Ala Gly Glu Ile Val Glu
 225 230 235 240
 Tyr Gly Thr Val Glu Glu Val Phe Tyr Asp Pro Arg His Pro Tyr Thr
 245 250 255
 Trp Ser Leu Leu Ser Ser Leu Pro Gln Leu Ala Asp Asp Lys Gly Asp

260

265

270

Leu Tyr Ser Ile Pro Gly Thr Pro Pro Ser Leu Tyr Thr Asp Leu Lys
 275 280

Gly Asp Ala Phe Ala Leu Arg Ser Asp Tyr Ala Met Gln Ile Asp Phe
 290 295 300

Glu Gln Lys Ala Pro Gln Phe Ser Val Ser Glu Thr His Trp Ala Lys
 305 310 315 320

Thr Trp Leu Leu His Glu Asp Ala Pro Lys Val Glu Lys Pro Ala Val
 325 330 335

Ile Ala Asn Leu His Asp Lys Ile Arg Glu Lys Met Gly Phe Ala His
 340 345 350

Leu Ala Asp
 355

<210> 220

<211> 659

<212> PRT

<213> Streptococcus pneumoniae

<400> 220

Met Lys Lys Asn Arg Val Phe Ala Thr Ala Gly Leu Val Leu Leu Ala
 1 5 10 15

Ala Gly Val Leu Ala Ala Cys Ser Ser Ser Lys Ser Ser Asp Ser Ser
 20 25 30

Ala Pro Lys Ala Tyr Gly Tyr Val Tyr Thr Ala Asp Pro Glu Thr Leu
 35 40 45

Asp Tyr Leu Ile Ser Ser Lys Asn Ser Thr Thr Val Thr Ser Asn
 50 55 60

Gly Ile Asp Gly Leu Phe Thr Asn Asp Asn Tyr Gly Asn Leu Ala Pro
 65 70 75 80

Ala Val Ala Glu Asp Trp Glu Val Ser Lys Asp Gly Leu Thr Tyr Thr
 85 90 95

Tyr Lys Ile Arg Lys Gly Val Lys Trp Phe Thr Ser Asp Gly Glu Glu
 100 105 110

Tyr Ala Glu Val Thr Ala Lys Asp Phe Val Asn Gly Leu Lys His Ala
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Ala Asp Lys Lys Ser Glu Ala Met Tyr Leu Ala Glu Asn Ser Val Lys
 130 135 140
 Gly Leu Ala Asp Tyr Leu Ser Gly Thr Ser Thr Asp Phe Ser Thr Val
 145 150 155
 Gly Val Lys Ala Val Asp Asp Tyr Thr Leu Gln Tyr Thr Leu Asn Gln
 165 170 175
 Pro Glu Pro Phe Trp Asn Ser Lys Leu Thr Tyr Ser Ile Phe Trp Pro
 180 185 190
 Leu Asn Glu Glu Phe Glu Thr Ser Lys Gly Ser Asp Phe Ala Lys Pro
 195 200 205
 Thr Asp Pro Thr Ser Leu Leu Tyr Asn Gly Pro Phe Leu Leu Lys Gly
 210 215 220
 Leu Thr Ala Lys Ser Ser Val Glu Phe Val Lys Asn Glu Gln Tyr Trp
 225 230 235 240
 Asp Lys Glu Asn Val His Leu Asp Thr Ile Asn Leu Ala Tyr Tyr Asp
 245 250 255
 Gly Ser Asp Gln Glu Ser Leu Glu Arg Asn Phe Thr Ser Gly Ala Tyr
 260 265 270
 Ser Tyr Ala Arg Leu Tyr Pro Thr Ser Ser Asn Tyr Ser Lys Val Ala
 275 280 285
 Glu Glu Tyr Lys Asp Asn Ile Tyr Tyr Thr Gln Ser Gly Ser Gly Ile
 290 295 300
 Ala Gly Leu Gly Val Asn Ile Asp Arg Gln Ser Tyr Asn Tyr Thr Ser
 305 310 315 320
 Lys Thr Thr Asp Ser Glu Lys Val Ala Thr Lys Lys Ala Leu Leu Asn
 325 330 335
 Lys Asp Phe Arg Gln Ala Leu Asn Phe Ala Leu Asp Arg Ser Ala Tyr
 340 345 350
 Ser Ala Gln Ile Asn Gly Lys Asp Gly Ala Ala Leu Ala Val Arg Asn
 355 360 365

1028462_1.TXT

Leu Phe Val Lys Pro Asp Phe Val Ser Ala Gly Glu Lys Thr Phe Gly
 370 375 380
 Asp Leu Val Ala Ala Gln Leu Pro Ala Tyr Gly Asp Glu Trp Lys Gly
 385 390 395 400
 Val Asn Leu Ala Asp Gly Gln Asp Gly Leu Phe Asn Ala Asp Lys Ala
 405 410 415
 Lys Ala Glu Phe Ala Lys Ala Lys Lys Ala Leu Glu Ala Asp Gly Val
 420 425 430
 Gln Phe Pro Ile His Leu Asp Val Pro Val Asp Gln Ala Ser Lys Asn
 435 440 445
 Tyr Ile Ser Arg Ile Gln Ser Phe Lys Gln Ser Val Glu Thr Val Leu
 450 455 460
 Gly Val Glu Asn Val Val Val Asp Ile Gln Gln Met Thr Ser Asp Glu
 465 470 475 480
 Phe Leu Asn Ile Thr Tyr Tyr Ala Ala Asn Ala Ser Ser Glu Asp Trp
 485 490 495
 Asp Val Ser Gly Gly Val Ser Trp Gly Pro Asp Tyr Gln Asp Pro Ser
 500 505 510
 Thr Tyr Leu Asp Ile Leu Lys Thr Thr Ser Ser Glu Thr Thr Lys Thr
 515 520 525
 Tyr Leu Gly Phe Asp Asn Pro Asn Ser Pro Ser Val Val Gln Val Gly
 530 535 540
 Leu Lys Glu Tyr Asp Lys Leu Val Asp Glu Ala Ala Arg Glu Thr Ser
 545 550 555 560
 Asp Leu Asn Val Arg Tyr Glu Lys Tyr Ala Ala Ala Gln Ala Trp Leu
 565 570 575
 Thr Asp Ser Ser Leu Phe Ile Pro Ala Met Ala Ser Ser Gly Ala Ala
 580 585 590
 Pro Val Leu Ser Arg Ile Val Pro Phe Thr Gly Ala Ser Ala Gln Thr
 595 600 605
 Gly Ser Lys Gly Ser Asp Val Tyr Phe Lys Tyr Leu Lys Ser Gln Asp
 610 615 620

1028462_1.TXT

Lys Val Val Thr Lys Glu Glu Tyr Glu Lys Ala Arg Glu Lys Trp Leu
625 630 635 640

Lys Glu Lys Ala Glu Ser Asn Glu Lys Ala Gln Lys Glu Leu Ala Ser
645 650 655

His Val Lys

<210> 221
<211> 318
<212> PRT
<213> Streptococcus pneumoniae

<400> 221

Met Glu Ile Asn Val Ser Lys Leu Arg Thr Asp Leu Pro Gln Val Gly
1 5 10 15

Val Gln Pro Tyr Arg Gln Val His Ala His Ser Thr Gly Asn Pro His
20 25 30

Ser Thr Val Gln Asn Glu Ala Asp Tyr His Trp Arg Lys Asp Pro Glu
35 40 45

Leu Gly Phe Phe Ser His Ile Val Gly Asn Gly Cys Ile Met Gln Val
50 55 60

Gly Pro Val Asp Asn Gly Ala Trp Asp Val Gly Gly Gly Trp Asn Ala
65 70 75 80

Glu Thr Tyr Ala Ala Val Glu Leu Ile Glu Ser His Ser Thr Lys Glu
85 90 95

Glu Phe Met Thr Asp Tyr Arg Leu Tyr Ile Glu Leu Leu Arg Asn Leu
100 105 110

Ala Asp Glu Ala Gly Leu Pro Lys Thr Leu Asp Thr Gly Ser Leu Ala
115 120 125

Gly Ile Lys Thr His Glu Tyr Cys Thr Asn Asn Gln Pro Asn Asn His
130 135 140

Ser Asp His Val Asp Pro Tyr Pro Tyr Leu Ala Lys Trp Gly Ile Ser
145 150 155 160

Arg Glu Gln Phe Lys His Asp Ile Glu Asn Gly Leu Thr Ile Glu Thr
165 170 175

1028462_1.TXT

Gly Trp Gln Lys Asn Asp Thr Gly Tyr Trp Tyr Val His Ser Asp Gly
180 185 190

Ser Tyr Pro Lys Asp Lys Phe Glu Lys Ile Asn Gly Thr Trp Tyr Tyr
195 200 205

Phe Asp Ser Ser Gly Tyr Met Leu Ala Asp Arg Trp Arg Lys His Thr
210 215 220

Asp Gly Asn Trp Tyr Trp Phe Asp Asn Ser Gly Glu Met Ala Thr Gly
225 230 235 240

Trp Lys Lys Ile Ala Asp Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala
245 250 255

Met Lys Thr Gly Trp Val Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp
260 265 270

Ala Lys Glu Gly Ala Met Val Ser Asn Ala Phe Ile Gln Ser Ala Asp
275 280 285

Gly Thr Gly Trp Tyr Tyr Leu Lys Pro Asp Gly Thr Leu Ala Asp Lys
290 295 300

Pro Glu Phe Thr Val Glu Pro Asp Gly Leu Ile Thr Val Lys
305 310 315

<210> 222
<211> 467
<212> PRT
<213> Streptococcus pneumoniae

<400> 222

Met Lys Lys Lys Tyr Trp Thr Leu Ala Ile Leu Phe Phe Cys Leu Phe
1 5 10 15

Asn Asn Ser Val Thr Ala Gln Glu Ile Pro Lys Asn Leu Asp Gly Asn
20 25 30

Ile Thr His Thr Gln Thr Ser Glu Ser Phe Ser Glu Ser Asp Glu Lys
35 40 45

Gln Val Asp Tyr Ser Asn Lys Asn Gln Glu Glu Val Asp Gln Asn Lys
50 55 60

Phe Arg Ile Gln Ile Asp Lys Thr Glu Leu Phe Val Thr Thr Asp Lys
65 70 75 80

1028462_1.TXT

His Leu Glu Lys Asn Cys Cys Lys Leu Glu Leu Glu Pro Gln Ile Asn
 85 90 95
 Asn Asp Ile Val Asn Ser Glu Ser Asn Asn Leu Leu Gly Glu Asp Asn
 100 105 110
 Leu Asp Asn Lys Ile Lys Glu Asn Val Ser His Leu Asp Asn Arg Gly
 115 120 125
 Gly Asn Ile Glu His Asp Lys Asp Asn Leu Glu Ser Ile Val Arg
 130 135 140
 Lys Tyr Glu Trp Asp Ile Asp Lys Val Thr Gly Gly Glu Ser Tyr
 145 150 155 160
 Lys Leu Tyr Ser Lys Ser Asn Ser Lys Val Ser Ile Ala Ile Leu Asp
 165 170 175
 Ser Gly Val Asp Leu Gln Asn Thr Gly Leu Leu Lys Asn Leu Ser Asn
 180 185 190
 His Ser Lys Asn Tyr Val Pro Asn Lys Gly Tyr Leu Gly Lys Glu Glu
 195 200 205
 Gly Glu Glu Gly Ile Ile Ser Asp Ile Gln Asp Arg Leu Gly His Gly
 210 215 220
 Thr Ala Val Val Ala Gln Ile Val Gly Asp Asp Asn Ile Asn Gly Val
 225 230 235 240
 Asn Pro His Val Asn Ile Asn Val Tyr Arg Ile Phe Gly Lys Ser Ser
 245 250 255
 Ala Ser Pro Asp Trp Ile Val Lys Ala Ile Phe Asp Ala Val Asp Asp
 260 265 270
 Gly Asn Asp Ile Ile Asn Leu Ser Thr Gly Gln Tyr Leu Met Ile Asp
 275 280 285
 Gly Glu Tyr Glu Asp Gly Thr Asn Asp Phe Glu Thr Phe Leu Lys Tyr
 290 295 300
 Lys Lys Ala Ile Asp Tyr Ala Asn Gln Lys Gly Val Ile Ile Val Ala
 305 310 315 320
 Ala Leu Gly Asn Asp Ser Leu Asn Val Ser Asn Gln Ser Asp Leu Leu
 325 330 335

1028462_1.TXT

Lys Leu Ile Ser Ser Arg Lys Lys Val Arg Lys Pro Gly Leu Val Val
340 345 350

Asp Val Pro Ser Tyr Phe Ser Ser Thr Ile Ser Val Gly Gly Ile Asp
355 360 365

Arg Leu Gly Asn Leu Ser Asp Phe Ser Asn Lys Gly Asp Ser Asp Ala
370 375 380

Ile Tyr Ala Pro Ala Gly Ser Thr Leu Ser Leu Ser Glu Leu Gly Leu
385 390 395 400

Asn Asn Phe Ile Asn Ala Glu Lys Tyr Lys Glu Asp Trp Ile Phe Ser
405 410 415

Ala Thr Leu Gly Gly Tyr Thr Tyr Leu Tyr Gly Asn Ser Phe Ala Ala
420 425 430

Pro Lys Val Ser Gly Ala Ile Ala Met Ile Ile Asp Lys Tyr Lys Leu
435 440 445

Lys Asp Gln Pro Tyr Asn Tyr Met Phe Val Lys Lys Phe Trp Lys Lys
450 455 460

His Tyr Gln
465

<210> 223
<211> 308
<212> PRT
<213> Streptococcus pneumoniae

<400> 223

Met Lys Lys Asp Glu Leu Phe Glu Gly Phe Tyr Leu Ile Lys Ser Ala
1 5 10 15

Asp Leu Arg Gln Thr Arg Ala Gly Lys Asn Tyr Leu Ala Phe Thr Phe
20 25 30

Gln Asp Asp Ser Gly Glu Ile Asp Gly Lys Leu Trp Asp Ala Gln Pro
35 40 45

His Asn Ile Glu Ala Phe Thr Ala Gly Lys Val Val His Met Lys Gly
50 55 60

Arg Arg Glu Val Tyr Asn Asn Thr Pro Gln Val Asn Gln Ile Thr Leu
65 70 75 80

1028462_1.TXT

Arg Leu Pro Gln Ala Gly Glu Pro Asn Asp Pro Ala Asp Phe Lys Val
 85 90 95
 Lys Ser Pro Val Asp Val Lys Glu Ile Arg Asp Tyr Met Ser Gln Met
 100 105 110
 Ile Phe Lys Ile Glu Asn Pro Val Trp Gln Arg Ile Val Arg Asn Leu
 115 120 125
 Tyr Thr Lys Tyr Asp Lys Glu Phe Tyr Ser Tyr Pro Ala Ala Lys Thr
 130 135 140
 Asn His His Ala Phe Glu Thr Gly Leu Ala Tyr His Thr Ala Thr Met
 145 150 155 160
 Val Arg Leu Ala Asp Ala Ile Ser Glu Val Tyr Pro Gln Leu Asn Lys
 165 170 175
 Ser Leu Leu Tyr Ala Gly Ile Met Leu His Asp Leu Ala Lys Val Ile
 180 185 190
 Glu Leu Thr Gly Pro Asp Gln Thr Glu Tyr Thr Val Arg Gly Asn Leu
 195 200 205
 Leu Gly His Ile Ala Leu Ile Asp Ser Glu Ile Thr Lys Thr Val Met
 210 215 220
 Glu Leu Gly Ile Asp Asp Thr Lys Glu Glu Val Val Leu Leu Arg His
 225 230 235 240
 Val Ile Leu Ser His His Gly Leu Leu Glu Tyr Gly Ser Pro Val Arg
 245 250 255
 Pro Arg Ile Met Glu Ala Glu Ile Ile His Met Ile Asp Asn Leu Asp
 260 265 270
 Ala Ser Met Met Met Met Ser Thr Ala Leu Ala Leu Val Asp Lys Gly
 275 280 285
 Glu Met Thr Asn Lys Ile Phe Ala Met Asp Asn Arg Ser Phe Tyr Lys
 290 295 300
 Pro Asp Leu Asp
 305

<210> 224

<211> 221
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 224

Val Thr Ile Leu Gly Lys Asp Thr Val Gln Gln Ser Ala Lys Gly Glu
 1 5 10 15

Ser Val Thr Gln Glu Ala Thr Pro Glu Tyr Lys Leu Glu Asn Thr Pro
 20 25 30

Gly Gly Asp Lys Gly Gly Asn Thr Gly Ser Ser Asp Ala Asn Ala Asn
 35 40 45

Glu Gly Gly Gly Ser Gln Ala Gly Gly Ser Ala His Thr Gly Ser Gln
 50 55 60

Asn Ser Ala Gln Ser Gln Ala Ser Lys Gln Leu Ala Thr Glu Lys Glu
 65 70 75 80

Ser Ala Lys Asn Ala Ile Glu Lys Ala Ala Lys Asp Lys Gln Asp Glu
 85 90 95

Ile Lys Gly Ala Pro Leu Ser Asp Lys Glu Lys Ala Glu Leu Leu Ala
 100 105 110

Arg Val Glu Ala Glu Lys Gln Ala Ala Leu Lys Glu Ile Glu Asn Ala
 115 120 125

Lys Thr Met Glu Asp Val Lys Glu Ala Glu Thr Ile Gly Val Gln Ala
 130 135 140

Ile Ala Met Val Thr Val Pro Lys Arg Pro Val Ala Pro Asn Ala Ala
 145 150 155 160

Pro Lys Thr Thr Ser Ala Pro Gln Ala Thr Ala Gly Thr Met Gln Asp
 165 170 175

Val Thr Tyr Gln Ser Pro Ala Gly Lys Gln Leu Pro Asn Thr Gly Ser
 180 185 190

Ala Ser Ser Ala Ala Leu Ala Ser Leu Gly Leu Val Val Ala Thr Ser
 195 200 205

Gly Phe Ala Leu Leu Gly Arg Lys Thr Arg Arg Arg Lys
 210 215 220

<210> 225

1028462_1.TXT

<211> 336
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 225

Met Asn Ala Asp Asp Thr Val Thr Ile Tyr Asp Val Ala Arg Glu Ala
 1 5 10 15

Gly Val Ser Met Ala Thr Val Ser Arg Val Val Asn Gly Asn Lys Asn
 20 25 30

Val Lys Glu Asn Thr Arg Lys Lys Val Leu Glu Val Ile Asp Arg Leu
 35 40 45

Asp Tyr Arg Pro Asn Ala Val Ala Arg Gly Leu Ala Ser Lys Lys Thr
 50 55 60

Thr Thr Val Gly Val Val Ile Pro Asn Ile Thr Asn Gly Tyr Phe Ser
 65 70 75 80

Ser Leu Ala Lys Gly Ile Asp Asp Ile Ala Glu Met Tyr Lys Tyr Asn
 85 90 95

Ile Val Leu Ala Asn Ser Asp Glu Asp Asn Glu Lys Glu Val Ser Val
 100 105 110

Val Asn Thr Leu Phe Ser Lys Gln Val Asp Gly Ile Ile Tyr Met Gly
 115 120 125

Tyr His Leu Thr Asp Lys Ile Arg Ser Glu Phe Ser Arg Ser Arg Thr
 130 135 140

Pro Ile Val Leu Ala Gly Thr Val Asp Val Glu His Gln Leu Pro Ser
 145 150 155 160

Val Asn Ile Asp Tyr Lys Gln Ala Thr Ile Asp Ala Val Ser Tyr Leu
 165 170 175

Ala Lys Glu Asn Glu Arg Ile Ala Phe Val Ser Gly Pro Leu Val Asp
 180 185 190

Asp Ile Asn Gly Lys Val Arg Leu Val Gly Tyr Lys Glu Thr Leu Lys
 195 200 205

Lys Ala Gly Ile Thr Tyr Ser Glu Gly Leu Val Phe Glu Ser Lys Tyr
 210 215 220

Ser Tyr Asp Asp Gly Tyr Ala Leu Ala Glu Arg Leu Ile Ser Ser Asn
 Page 334

225 230 235 240

Ala Thr Ala Ala Val Val Thr Gly Asp Glu Leu Ala Ala Gly Val Leu
245 250 255

Asn Gly Leu Ala Asp Lys Gly Val Ser Val Pro Glu Asp Phe Glu Ile
260 265 270

Ile Thr Ser Asp Asp Ser Gln Ile Ser Arg Phe Thr Arg Pro Asn Leu
275 280 285

Thr Thr Ile Ala Gln Pro Leu Tyr Asp Leu Gly Ala Ile Ser Met Arg
290 295 300

Met Leu Thr Lys Ile Met His Lys Glu Glu Leu Glu Glu Arg Glu Val
305 310 315 320

Leu Leu Pro His Gly Leu Thr Glu Arg Ser Ser Thr Arg Lys Arg Lys
325 330 335

<210> 226

<211> 469

<212> PRT

<213> Streptococcus pneumoniae

<400> 226

Met Lys Lys Lys Leu Val Phe Pro Asn Leu Phe Trp Trp Gly Ala Ala
1 5 10 15

Ser Ser Gly Pro Gln Thr Glu Gly Gln Tyr Gly Lys Val His Glu Asn
20 25 30

Val Met Asp Tyr Trp Phe Lys Thr His Pro Glu Asp Phe Phe Asp Asn
35 40 45

Val Gly Pro Leu Val Ala Ser Asn Phe Phe His Thr Tyr Thr Glu Asp
50 55 60

Phe His Leu Met Lys Glu Ile Gly Val Asn Ser Phe Arg Thr Ser Ile
65 70 75 80

Gln Trp Ser Arg Leu Ile Lys Asn Leu Glu Thr Gly Glu Pro Asp Pro
85 90 95

Lys Gly Ile Ala Phe Tyr Asn Ala Ile Ile Glu Glu Ala Lys Lys Asn
100 105 110

Gln Met Asp Leu Val Met Asn Leu His His Phe Asp Leu Pro Val Glu
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115

120

125

Leu Leu Gln Lys Tyr Gly Gly Trp Glu Ser Lys His Val Val Glu Leu
 130 135 140

Phe Val Lys Phe Ala Lys Thr Ala Phe Thr Cys Phe Gly Asp Lys Val
 145 150 155 160

His Tyr Trp Thr Thr Phe Asn Glu Pro Met Val Ile Pro Glu Ala Gly
 165 170 175

Tyr Leu Tyr Ala Phe His Tyr Pro Asn Leu Lys Gly Lys Gly Glu
 180 185 190

Ala Val Gln Val Ile Tyr Asn Leu Asn Leu Ala Ser Ala Lys Val Ile
 195 200 205

Gln Leu Tyr Arg Ser Leu Glu Leu Asp Gly Lys Ile Gly Ile Ile Leu
 210 215 220

Asn Leu Thr Pro Ala Tyr Pro Arg Ser Asn Ser Pro Glu Asp Leu Glu
 225 230 235 240

Ala Ser Arg Phe Thr Asp Asp Phe Phe Asn Lys Val Phe Leu Asn Pro
 245 250 255

Ala Val Lys Gly Thr Phe Pro Glu Arg Leu Val Lys Gln Leu Glu Arg
 260 265 270

Asp Gly Val Leu Trp Ser His Thr Glu Lys Glu Leu Gln Leu Met Lys
 275 280 285

Ser Asn Thr Val Asp Phe Leu Gly Val Asn Tyr Tyr His Pro Lys Arg
 290 295 300

Val Gln Ala Gln Ala Asn Pro Glu Glu Tyr Gln Thr Pro Trp Met Pro
 305 310 315 320

Asp Gln Tyr Phe Lys Glu Tyr Glu Trp Leu Glu Arg Arg Met Asn Pro
 325 330 335

Tyr Arg Gly Trp Glu Ile Phe Pro Lys Ala Ile Tyr Asp Ile Ala Met
 340 345 350

Ile Val Lys Glu Glu Tyr Gly Asn Ile Pro Trp Phe Ile Ser Glu Asn
 355 360 365

1028462_1.TXT

Gly Met Gly Val Glu Asn Glu Ala Arg Phe Ile Asp Glu Asn Gly Val
 370 375 380

Ile Asp Asp Val Tyr Arg Ile Glu Phe Tyr Glu Glu His Leu Arg Trp
 385 390 395 400

Leu His Lys Ala Ile Glu Glu Gly Ser His Cys Phe Gly Tyr His Ala
 405 410 415

Trp Thr Ala Phe Asp Cys Trp Ser Trp Asn Asn Ala Tyr Lys Asn Arg
 420 425 430

Tyr Gly Phe Ile Ser Val Asp Leu Glu Thr Gln Lys Arg Thr Ile Lys
 435 440 445

Ser Ser Gly Arg Trp Tyr Arg Lys Val Ser Asp Asn Asn Gly Phe Glu
 450 455 460

Val Glu Ile Glu Glu
 465

<210> 227

<211> 136

<212> PRT

<213> Streptococcus pneumoniae

<400> 227

Val Glu Asn Leu Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr
 1 5 10 15

Arg Pro Arg Leu Glu Leu Leu Ala Val Val Thr Ile Val Phe Cys Ala
 20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu
 35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met
 50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly
 65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys
 85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly
 100 105 110

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Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe
 115 120 125

Lys Gln Gly Val Phe Gln Gln Lys
 130 135

<210> 228
 <211> 207
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 228

Met Leu Asn Lys Ile Arg Asp Tyr Leu Asp Phe Ala Gly Leu Gln Tyr
 1 5 10 15

Arg Asn Pro Asp Lys Ala Gly Ala Glu Arg Glu Lys Met Leu Ala Phe
 20 25 30

Arg His Lys Gly Gln Glu Ala Arg Lys Val Phe Thr Glu Leu Ala Lys
 35 40 45

Ala Phe Gln Ala Ser His Pro Glu Trp Gln Leu Gln Gln Thr Ser Gln
 50 55 60

Trp Met Asn Gln Ala Gln Arg Leu Arg Pro His Phe Trp Val Tyr Leu
 65 70 75 80

Gln Arg Asp Gly Gln Val Thr Glu Pro Met Met Ala Leu Arg Leu Tyr
 85 90 95

Gly Thr Ser Thr Asp Phe Gly Ile Ser Leu Glu Val Ser Phe Ile Glu
 100 105 110

Arg Lys Lys Asp Glu Gln Thr Leu Gly Lys Gln Ala Lys Val Leu Asp
 115 120 125

Ile Pro Thr Val Lys Gly Ile Tyr Tyr Leu Thr Tyr Ser Asn Gly Gln
 130 135 140

Ser Gln Arg Trp Glu Ala Asn Glu Glu Lys Arg Arg Thr Leu Arg Glu
 145 150 155 160

Lys Val Arg Ser Gln Glu Val Arg Lys Val Leu Val Lys Val Asp Val
 165 170 175

Pro Met Thr Glu Asn Ser Ser Glu Glu Glu Ile Val Glu Gly Leu Leu
 180 185 190

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Lys Ser Tyr Ser Lys Ile Leu Pro Tyr Tyr Leu Ala Thr Arg Lys
 195 200 205

<210> 229
 <211> 152
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 229

Met Val Gln Asn Ser Cys Trp Gln Ser Lys Ser His Lys Val Lys Ala
 1 5 10 15

Phe Thr Leu Leu Glu Ser Leu Leu Ala Leu Ile Val Ile Ser Gly Gly
 20 25 30

Leu Leu Leu Phe Gln Ala Met Ser Gln Leu Leu Ile Ser Glu Val Arg
 35 40 45

Tyr Gln Gln Gln Ser Glu Gln Lys Glu Trp Leu Leu Phe Val Asp Gln
 50 55 60

Leu Glu Val Glu Leu Asp Arg Ser Gln Phe Glu Lys Val Glu Gly Asn
 65 70 75 80

Arg Leu Tyr Met Lys Gln Asp Gly Lys Asp Ile Ala Ile Gly Lys Ser
 85 90 95

Lys Ser Asp Asp Phe Arg Lys Thr Asn Ala Arg Gly Arg Gly Tyr Gln
 100 105 110

Pro Met Val Tyr Gly Leu Lys Ser Val Arg Ile Thr Glu Asp Asn Gln
 115 120 125

Leu Val Arg Phe His Phe Gln Phe Gln Lys Gly Leu Glu Arg Glu Phe
 130 135 140

Ile Tyr Arg Val Glu Lys Glu Lys
 145 150

<210> 230
 <211> 108
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 230

Met Lys Lys Met Met Thr Phe Leu Lys Lys Ala Lys Val Lys Ala Phe
 1 5 10 15

Thr Leu Val Glu Met Leu Val Val Leu Leu Ile Ile Ser Val Leu Phe
 Page 339

Leu Leu Phe Val Pro Asn Leu Thr Lys Gln Lys Glu Ala Val Asn Asp
35 40 45

Lys Gly Lys Ala Ala Val Val Lys Val Val Glu Ser Gln Ala Glu Leu
50 55 60

Tyr Ser Leu Glu Lys Asn Glu Asp Ala Ser Leu Arg Lys Leu Gln Ala
65 70 75 80

Asp Gly Arg Ile Thr Glu Glu Gln Ala Lys Ala Tyr Lys Glu Tyr Asn
85 90 95

Asp Lys Asn Gly Glu Ala Asn Arg Lys Val Asn Asp
100 105

<210> 231

<211> 299

<212> PRT

<213> Streptococcus pneumoniae

<400> 231

Met Thr Ser Lys Val Arg Lys Ala Val Ile Pro Ala Ala Gly Leu Gly
1 5 10 15

Thr Arg Phe Leu Pro Ala Thr Lys Ala Leu Ala Lys Glu Met Leu Pro
20 25 30

Ile Val Asp Lys Pro Thr Ile Gln Phe Ile Val Glu Glu Ala Leu Lys
35 40 45

Ser Gly Ile Glu Asp Ile Leu Val Val Thr Gly Lys Ser Lys Arg Ser
50 55 60

Ile Glu Asp His Phe Asp Ser Asn Phe Glu Leu Glu Tyr Asn Leu Lys
65 70 75 80

Glu Lys Gly Lys Thr Asp Leu Leu Lys Leu Val Asp Lys Thr Thr Asp
85 90 95

Met Arg Leu His Phe Ile Arg Gln Thr His Pro Arg Gly Leu Gly Asp
100 105 110

Ala Val Leu Gln Ala Lys Ala Phe Val Gly Asn Glu Pro Phe Val Val
115 120 125

Met Leu Gly Asp Asp Leu Met Asp Ile Thr Asp Glu Lys Ala Val Pro
Page 340

130

135

Leu Thr Lys Gln Leu Met Asp Asp Tyr Glu Arg Thr His Ala Ser Thr
145 150 155 160

Ile Ala Val Met Pro Val Pro His Asp Glu Val Ser Ala Tyr Gly Val
165 170 175

Ile Ala Pro Gln Gly Glu Gly Lys Asp Gly Leu Tyr Ser Val Glu Thr
180 185 190

Phe Val Glu Lys Pro Ala Pro Glu Asp Ala Pro Ser Asp Leu Ala Ile
195 200 205

Ile Gly Arg Tyr Leu Leu Thr Pro Glu Ile Phe Glu Ile Leu Glu Lys
210 215 220

Gln Ala Pro Gly Ala Gly Asn Glu Ile Gln Leu Thr Asp Ala Ile Asp
225 230 235 240

Thr Leu Asn Lys Thr Gln Arg Val Phe Ala Arg Glu Phe Lys Gly Ala
245 250 255

Arg Tyr Asp Val Gly Asp Lys Phe Gly Phe Met Lys Thr Ser Ile Asp
260 265 270

Tyr Ala Leu Lys His Pro Gln Val Lys Asp Asp Leu Lys Asn Tyr Leu
275 280 285

Ile Gln Leu Gly Lys Glu Leu Thr Glu Lys Glu
290 295

<210> 232
<211> 821
<212> PRT
<213> Streptococcus pneumoniae

<400> 232

Met Gln Asn Gln Leu Asn Glu Leu Lys Arg Lys Met Leu Glu Phe Phe
1 5 10 15

Gln Gln Lys Gln Lys Asn Lys Lys Ser Ala Arg Pro Gly Lys Lys Gly
20 25 30

Ser Ser Thr Lys Lys Ser Lys Thr Leu Asp Lys Ser Val Ile Phe Pro
35 40 45

Ala Ile Leu Leu Ser Ile Lys Ala Leu Phe Asn Leu Leu Phe Val Leu
Page 341

50

55

Gly Phe Leu Gly Gly Met Leu Gly Ala Gly Ile Ala Leu Gly Tyr Gly
 65 70 75 80
 Val Ala Leu Phe Asp Lys Val Arg Val Pro Gln Thr Glu Glu Leu Val
 85 90 95
 Asn Gln Val Lys Asp Ile Ser Ser Ile Ser Glu Ile Thr Tyr Ser Asp
 100 105 110
 Gly Thr Val Ile Ala Ser Ile Glu Ser Asp Leu Leu Arg Thr Ser Ile
 115 120 125
 Ser Ser Glu Gln Ile Ser Glu Asn Leu Lys Lys Ala Ile Ile Ala Thr
 130 135 140
 Glu Asp Glu His Phe Lys Glu His Lys Gly Val Val Pro Lys Ala Val
 145 150 155 160
 Ile Arg Ala Thr Leu Gly Lys Phe Val Gly Leu Gly Ser Ser Ser Gly
 165 170 175
 Gly Ser Thr Leu Thr Gln Gln Leu Ile Lys Gln Gln Val Val Gly Asp
 180 185 190
 Ala Pro Thr Leu Ala Arg Lys Ala Ala Glu Ile Val Asp Ala Leu Ala
 195 200 205
 Leu Glu Arg Ala Met Asn Lys Asp Glu Ile Leu Thr Thr Tyr Leu Asn
 210 215 220
 Val Ala Pro Phe Gly Arg Asn Asn Lys Gly Gln Asn Ile Ala Gly Ala
 225 230 235 240
 Arg Gln Ala Ala Glu Gly Ile Phe Gly Val Asp Ala Ser Gln Leu Thr
 245 250 255
 Val Pro Gln Ala Ala Phe Leu Ala Gly Leu Pro Gln Ser Pro Ile Thr
 260 265 270
 Tyr Ser Pro Tyr Glu Asn Thr Gly Glu Leu Lys Ser Asp Glu Asp Leu
 275 280 285
 Glu Ile Gly Leu Arg Arg Ala Lys Ala Val Leu Tyr Ser Met Tyr Arg
 290 295 300

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Thr Gly Ala Leu Ser Lys Asp Glu Tyr Ser Gln Tyr Lys Asp Tyr Asp
 305 310 315 320
 Leu Lys Gln Asp Phe Leu Pro Ser Gly Thr Val Thr Gly Ile Ser Arg
 325 330 335
 Asp Tyr Leu Tyr Phe Thr Thr Leu Ala Glu Ala Gln Glu Arg Met Tyr
 340 345 350
 Asp Tyr Leu Ala Gln Arg Asp Asn Val Ser Ala Lys Glu Leu Lys Asn
 355 360 365
 Glu Ala Thr Gln Lys Phe Tyr Arg Asp Leu Ala Ala Lys Glu Ile Glu
 370 375 380
 Asn Gly Gly Tyr Lys Ile Thr Thr Thr Ile Asp Gln Lys Ile His Ser
 385 390 395 400
 Ala Met Gln Ser Ala Val Ala Asp Tyr Gly Tyr Leu Leu Asp Asp Gly
 405 410 415
 Thr Gly Arg Val Glu Val Gly Asn Val Leu Met Asp Asn Gln Thr Gly
 420 425 430
 Ala Ile Leu Gly Phe Val Gly Gly Arg Asn Tyr Gln Glu Asn Gln Asn
 435 440 445
 Asn His Ala Phe Asp Thr Lys Arg Ser Pro Ala Ser Thr Thr Lys Pro
 450 455 460
 Leu Leu Ala Tyr Gly Ile Ala Ile Asp Gln Gly Leu Met Gly Ser Glu
 465 470 475 480
 Thr Ile Leu Ser Asn Tyr Pro Thr Asn Phe Ala Asn Gly Asn Pro Ile
 485 490 495
 Met Tyr Ala Asn Ser Lys Gly Thr Gly Met Met Thr Leu Gly Glu Ala
 500 505 510
 Leu Asn Tyr Ser Trp Asn Ile Pro Ala Tyr Trp Thr Tyr Arg Met Leu
 515 520 525
 Arg Glu Lys Gly Val Asp Val Lys Gly Tyr Met Glu Lys Met Gly Tyr
 530 535 540
 Glu Ile Pro Glu Tyr Gly Ile Glu Ser Leu Pro Met Gly Gly Gly Ile
 545 550 555 560

1028462_1.TXT

Glu Val Thr Val Ala Gln His Thr Asn Gly Tyr Gln Thr Leu Ala Asn
 565 570
 Asn Gly Val Tyr His Gln Lys His Val Ile Ser Lys Ile Glu Ala Ala
 580 585 590
 Asp Gly Arg Val Val Tyr Glu Tyr Gln Asp Lys Pro Val Gln Val Tyr
 595 600 605
 Ser Lys Ala Thr Ala Thr Ile Met Gln Gly Leu Leu Arg Glu Val Leu
 610 615 620
 Ser Ser Arg Val Thr Thr Phe Lys Ser Asn Leu Thr Ser Leu Asn
 625 630 635
 Pro Thr Leu Ala Asn Ala Asp Trp Ile Gly Lys Thr Gly Thr Thr Asn
 645 650 655
 Gln Asp Glu Asn Met Trp Leu Met Leu Ser Thr Pro Arg Leu Thr Leu
 660 665 670
 Gly Gly Trp Ile Gly His Asp Asp Asn His Ser Leu Ser Arg Arg Ala
 675 680 685
 Gly Tyr Ser Asn Asn Ser Asn Tyr Met Ala His Leu Val Asn Ala Ile
 690 695 700
 Gln Gln Ala Ser Pro Ser Ile Trp Gly Asn Glu Arg Phe Ala Leu Asp
 705 710 715 720
 Pro Ser Val Val Lys Ser Glu Val Leu Lys Ser Thr Gly Gln Lys Pro
 725 730 735
 Glu Lys Val Ser Val Glu Gly Lys Glu Val Glu Val Thr Gly Ser Thr
 740 745 750
 Val Thr Ser Tyr Trp Ala Asn Lys Ser Gly Ala Pro Ala Thr Ser Tyr
 755 760 765
 Arg Phe Ala Ile Gly Gly Ser Asp Ala Asp Tyr Gln Asn Ala Trp Ser
 770 775 780
 Ser Ile Val Gly Ser Leu Pro Thr Pro Ser Ser Ser Ser Ser Ser
 785 790 795 800
 Ser Ser Ser Ser Asp Ser Ser Asn Ser Ser Thr Thr Arg Pro Ser Ser
 805 810 815

Ser Arg Ala Arg Arg
820

<210> 233
<211> 423
<212> PRT
<213> Streptococcus pneumoniae

<400> 233

Met Ser Ser Lys Phe Met Lys Ser Ala Ala Val Leu Gly Thr Ala Thr
1 5 10 15

Leu Ala Ser Leu Leu Val Ala Cys Gly Ser Lys Thr Ala Asp Lys
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Pro Ala Asp Ser Gly Ser Ser Glu Val Lys Glu Leu Thr Val Tyr Val
35 40 45

Asp Glu Gly Tyr Lys Ser Tyr Ile Glu Glu Val Ala Lys Ala Tyr Glu
50 55 60

Lys Glu Ala Gly Val Lys Val Thr Leu Lys Thr Gly Asp Ala Leu Gly
65 70 75 80

Gly Leu Asp Lys Leu Ser Leu Asp Asn Gln Ser Gly Asn Val Pro Asp
85 90 95

Val Met Met Ala Pro Tyr Asp Arg Val Gly Ser Leu Gly Ser Asp Gly
100 105 110

Gln Leu Ser Glu Val Lys Leu Ser Asp Gly Ala Lys Thr Asp Asp Thr
115 120 125

Thr Lys Ser Leu Val Thr Ala Ala Asn Gly Lys Val Tyr Gly Ala Pro
130 135 140

Ala Val Ile Glu Ser Leu Val Met Tyr Tyr Asn Lys Asp Leu Val Lys
145 150 155 160

Asp Ala Pro Lys Thr Phe Ala Asp Leu Glu Asn Leu Ala Lys Asp Ser
165 170 175

Lys Tyr Ala Phe Ala Gly Glu Asp Gly Lys Thr Thr Ala Phe Leu Ala
180 185 190

Asp Trp Thr Asn Phe Tyr Tyr Thr Tyr Gly Leu Leu Ala Gly Asn Gly
195 200 205

1028462_1.TXT

Ala Tyr Val Phe Gly Gln Asn Gly Lys Asp Ala Lys Asp Ile Gly Leu
 210 215 220

Ala Asn Asp Gly Ser Ile Val Gly Ile Asn Tyr Ala Lys Ser Trp Tyr
 225 230 235 240

Glu Lys Trp Pro Lys Gly Met Gln Asp Thr Glu Gly Ala Gly Asn Leu
 245 250 255

Ile Gln Thr Gln Phe Gln Glu Gly Lys Thr Ala Ala Ile Ile Asp Gly
 260 265 270

Pro Trp Lys Ala Gln Ala Phe Lys Asp Ala Lys Val Asn Tyr Gly Val
 275 280 285

Ala Thr Ile Pro Thr Leu Pro Asn Gly Lys Glu Tyr Ala Ala Phe Gly
 290 295 300

Gly Gly Lys Ala Trp Val Ile Pro Gln Ala Val Lys Asn Leu Glu Ala
 305 310 315 320

Ser Gln Lys Phe Val Asp Phe Leu Val Ala Thr Glu Gln Gln Lys Val
 325 330 335

Leu Tyr Asp Lys Thr Asn Glu Ile Pro Ala Asn Thr Glu Ala Arg Ser
 340 345 350

Tyr Ala Glu Gly Lys Asn Asp Glu Leu Thr Thr Ala Val Ile Lys Gln
 355 360 365

Phe Lys Asn Thr Gln Pro Leu Pro Asn Ile Ser Gln Met Ser Ala Val
 370 375 380

Trp Asp Pro Ala Lys Asn Met Leu Phe Asp Ala Val Ser Gly Gln Lys
 385 390 395 400

Asp Ala Lys Thr Ala Ala Asn Asp Ala Val Thr Leu Ile Lys Glu Thr
 405 410 415

Ile Lys Gln Lys Phe Gly Glu
 420

<210> 234
 <211> 155
 <212> PRT
 <213> Streptococcus pneumoniae

1028462_1.TXT

<400> 234

Met Ile Asp Lys Val Val Arg Asn Leu Leu Leu Thr Phe Phe Phe Cys
 1 5 10 15

Lys Met Thr Lys Ile Ile Ile Phe Leu Thr Thr Ile Leu Val Lys Lys
 20 25 30

Lys Lys Ile Cys Tyr Asn Glu Phe Lys Leu Arg Asn Arg Lys Gln Lys
 35 40 45

Gly Val Ile Met Trp Val Leu Gly Phe Ile Leu Phe Met Ile Phe Phe
 50 55 60

Tyr Ser Asn Asn Ser Lys Lys Ile Lys Lys Leu Glu Asn Lys Ile Lys
 65 70 75 80

Arg Leu Glu Arg Lys Glu Lys Gly Asn Ala Glu Met Ser Arg Leu Leu
 85 90 95

Gln Glu Met Ile Gly Lys Glu Pro Ile Ile Thr Gly Val Tyr Ile Gly
 100 105 110

Pro Asp Asn Trp Glu Val Val Asp Val Asp Glu Glu Trp Val Lys Leu
 115 120 125

Arg Arg Val Asp Asn Thr Gly Lys Glu Lys Phe Lys Leu Gln Arg Ile
 130 135 140

Glu Asp Ile Gln Thr Val Glu Phe Asp Gly Glu
 145 150 155

<210> 235

<211> 285

<212> PRT

<213> Streptococcus pneumoniae

<400> 235

Met Ile Leu Ser Lys Asn Arg Glu Asp Gly Leu Arg Lys Phe Ala Thr
 1 5 10 15

Asn Ile Arg Leu Asn Thr Leu Arg Thr Leu Asn His Leu Gly Phe Gly
 20 25 30

His Tyr Gly Gly Ser Leu Ser Ile Val Glu Val Leu Ala Val Leu Tyr
 35 40 45

Gly Glu Ile Met Pro Met Thr Pro Glu Ile Phe Ala Ala Arg Asp Arg
 50 55 60

1028462_1.TXT

Asp Tyr Phe Ile Leu Ser Lys Gly His Gly Gly Pro Ala Leu Tyr Ser
 65 70 75
 Thr Leu Tyr Leu Asn Gly Phe Phe Asp Lys Glu Phe Leu Tyr Ser Leu
 85 90 95
 Asn Thr Asn Gly Thr Lys Leu Pro Ser His Pro Asp Arg Asn Leu Thr
 100 105 110
 Pro Gly Ile Asp Met Thr Thr Gly Ser Leu Gly Gln Gly Ile Ser Val
 115 120 125
 Ala Thr Gly Leu Ala Tyr Gly Gln Arg Ile Arg Lys Ser Pro Phe Tyr
 130 135 140
 Thr Tyr Ala Ile Val Gly Asp Gly Glu Leu Asn Glu Gly Gln Cys Trp
 145 150 155 160
 Glu Ala Ile Gln Phe Ala Ser His Gln Gln Leu Ser Asn Leu Ile Val
 165 170 175
 Phe Val Asp Asp Asn Lys Lys Gln Leu Asp Gly Phe Thr Lys Asp Ile
 180 185 190
 Cys Asn Pro Gly Asp Phe Val Glu Lys Phe Ser Ala Phe Gly Phe Glu
 195 200 205
 Ser Ile Arg Val Lys Gly Ser Asp Ile Arg Glu Ile Tyr Glu Gly Ile
 210 215 220
 Val Gln Leu Lys Gln Ser Asn Asn Ser Ser Pro Lys Cys Ile Val Leu
 225 230 235
 Asp Thr Ile Lys Gly Gln Gly Val Gln Glu Glu Glu Met Lys Ser
 245 250 255
 Asn His His Leu Arg Pro Thr Val Glu Glu Lys Gln Met Leu Thr Ser
 260 265 270
 Val Val Glu Arg Leu Ser Gln Glu Leu Glu Glu Thr Glu
 275 280 285

<210> 236
 <211> 621
 <212> PRT
 <213> Streptococcus pneumoniae

1028462_1.TXT

<400> 236

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Met Lys Lys Thr Thr Ile Leu Ser Leu Thr Thr Ala Ala Val Ile Leu
 1      5      10      15

Ala Ala Tyr Val Pro Asn Glu Pro Ile Leu Ala Asp Thr Pro Ser Ser
 20      25      30

Glu Val Ile Lys Glu Thr Lys Val Gly Ser Ile Ile Gln Gln Asn Asn
 35      40      45

Ile Lys Tyr Lys Val Leu Thr Val Glu Gly Asn Ile Gly Thr Val Gln
 50      55      60

Val Gly Asn Gly Val Thr Pro Val Glu Phe Glu Ala Gly Gln Asp Gly
 65      70      75      80

Lys Pro Phe Thr Ile Pro Thr Lys Ile Thr Val Gly Asp Lys Val Phe
 85      90      95

Thr Val Thr Glu Val Ala Ser Gln Ala Phe Ser Tyr Tyr Pro Asp Glu
100      105      110

Thr Gly Arg Ile Val Tyr Tyr Pro Ser Ser Ile Thr Ile Pro Ser Ser
115      120      125

Ile Lys Lys Ile Gln Lys Lys Gly Phe His Gly Ser Lys Ala Lys Thr
130      135      140

Ile Ile Phe Asp Lys Gly Ser Gln Leu Glu Lys Ile Glu Asp Arg Ala
145      150      155      160

Phe Asp Phe Ser Glu Leu Glu Glu Ile Glu Leu Pro Ala Ser Leu Glu
165      170      175

Tyr Ile Gly Thr Ser Ala Phe Ser Phe Ser Gln Lys Leu Lys Lys Leu
180      185      190

Thr Phe Ser Ser Ser Lys Leu Glu Leu Ile Ser His Glu Ala Phe
195      200      205

Ala Asn Leu Ser Asn Leu Glu Lys Leu Thr Leu Pro Lys Ser Val Lys
210      215      220

Thr Leu Gly Ser Asn Leu Phe Arg Leu Thr Thr Ser Leu Lys His Val
225      230      235      240

Asp Val Glu Glu Gly Asn Glu Ser Phe Ala Ser Val Asp Gly Val Leu

```

Phe Ser Lys Asp Lys Thr Gln Leu Ile Tyr Tyr Pro Ser Gln Lys Asn
 260 265 270
 Asp Glu Ser Tyr Lys Thr Pro Lys Glu Thr Lys Glu Leu Ala Ser Tyr
 275 280 285
 Ser Phe Asn Lys Asn Ser Tyr Leu Lys Lys Leu Glu Leu Asn Glu Gly
 290 295 300
 Leu Glu Lys Ile Gly Thr Phe Ala Phe Ala Asp Ala Ile Lys Leu Glu
 305 310 315 320
 Glu Ile Ser Leu Pro Asn Ser Leu Glu Thr Ile Glu Arg Leu Ala Phe
 325 330 335
 Tyr Gly Asn Leu Glu Leu Lys Glu Leu Ile Leu Pro Asp Asn Val Lys
 340 345 350
 Asn Phe Gly Lys His Val Met Asn Gly Leu Pro Lys Leu Lys Ser Leu
 355 360 365
 Thr Ile Gly Asn Asn Ile Asn Ser Leu Pro Ser Phe Phe Leu Ser Gly
 370 375 380
 Val Leu Asp Ser Leu Lys Glu Ile His Ile Lys Asn Lys Ser Thr Glu
 385 390 395 400
 Phe Ser Val Lys Lys Asp Thr Phe Ala Ile Pro Glu Thr Val Lys Phe
 405 410 415
 Tyr Val Thr Ser Glu His Ile Lys Asp Val Leu Lys Ser Asn Leu Ser
 420 425 430
 Thr Ser Asn Asp Ile Ile Val Glu Lys Val Asp Asn Ile Lys Gln Glu
 435 440 445
 Thr Asp Val Ala Lys Pro Lys Lys Asn Ser Asn Gln Gly Val Val Gly
 450 455 460
 Trp Val Lys Asp Lys Gly Leu Trp Tyr Tyr Leu Asn Glu Ser Gly Ser
 465 470 475 480
 Met Ala Thr Gly Trp Val Lys Asp Lys Gly Leu Trp Tyr Tyr Leu Asn
 485 490 495

1028462_1.TXT

Glu Ser Gly Ser Met Ala Thr Gly Trp Val Lys Asp Lys Gly Leu Trp
500 505 510

Tyr Tyr Leu Asn Glu Ser Gly Ser Met Ala Thr Gly Trp Val Lys Asp
515 520 525

Lys Gly Leu Trp Tyr Tyr Leu Asn Glu Ser Gly Ser Met Ala Thr Gly
530 535 540

Trp Val Lys Asp Lys Gly Leu Trp Tyr Tyr Leu Asn Glu Ser Gly Ser
545 550 555 560

Met Ala Thr Gly Trp Val Lys Asp Lys Gly Leu Trp Tyr Tyr Leu Asn
565 570 575

Glu Ser Gly Ser Met Ala Thr Gly Trp Val Thr Val Ser Gly Lys Trp
580 585 590

Tyr Tyr Thr Tyr Asn Ser Gly Asp Leu Leu Val Asn Thr Thr Thr Pro
595 600 605

Asp Gly Tyr Arg Val Asn Ala Asn Gly Glu Trp Val Gly
610 615 620

<210> 237
<211> 626
<212> PRT
<213> Streptococcus pneumoniae

<400> 237

Met Val Arg Phe Thr Gly Leu Ser Leu Lys Gln Thr Gln Ala Ile Glu
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Val Leu Lys Gly His Ile Ser Leu Pro Asp Val Glu Val Ala Val Thr
20 25 30

Gln Ser Asp Gln Ala Ser Ile Ser Ile Glu Gly Glu Glu Gly His Tyr
35 40 45

Gln Leu Thr Tyr Arg Lys Pro His Gln Leu Tyr Arg Ala Leu Ser Leu
50 55 60

Leu Val Thr Val Leu Ala Glu Ala Asp Lys Val Glu Ile Glu Glu Gln
65 70 75 80

Ala Ala Tyr Glu Asp Leu Ala Tyr Met Val Asp Cys Ser Arg Asn Ala
85 90 95

1028462_1.TXT

Val Leu Asn Val Ala Ser Ala Lys Gln Met Ile Glu Ile Leu Ala Leu
 100 105 110
 Met Gly Tyr Ser Thr Phe Glu Leu Tyr Met Glu Asp Thr Tyr Gln Ile
 115 120 125
 Glu Gly Gln Pro Tyr Phe Gly Tyr Phe Arg Gly Ala Tyr Ser Ala Glu
 130 135 140
 Glu Leu Gln Glu Ile Glu Ala Tyr Ala Gln Gln Phe Asp Val Thr Phe
 145 150 155 160
 Val Pro Cys Ile Gln Thr Leu Ala His Leu Ser Ala Phe Val Lys Trp
 165 170 175
 Gly Val Lys Glu Val Gln Glu Leu Arg Asp Val Glu Asp Ile Leu Leu
 180 185 190
 Ile Gly Glu Glu Lys Val Tyr Asp Leu Ile Asp Gly Met Phe Ala Thr
 195 200 205
 Leu Ser Lys Leu Lys Thr Arg Lys Val Asn Ile Gly Met Asp Glu Ala
 210 215 220
 His Leu Val Gly Leu Gly Arg Tyr Leu Ile Leu Asn Gly Val Val Asp
 225 230 235 240
 Arg Ser Leu Leu Met Cys Gln His Leu Glu Arg Val Leu Asp Ile Ala
 245 250 255
 Asp Lys Tyr Gly Phe His Cys Gln Met Trp Ser Asp Met Phe Phe Lys
 260 265 270
 Leu Met Ser Ala Asp Gly Gln Tyr Asp Arg Asp Val Glu Ile Pro Glu
 275 280 285
 Glu Thr Arg Val Tyr Leu Asp Arg Leu Lys Asp Arg Val Thr Leu Val
 290 295 300
 Tyr Trp Asp Tyr Tyr Gln Asp Ser Glu Glu Lys Tyr Asn Arg Asn Phe
 305 310 315 320
 Arg Asn His His Lys Ile Ser His Asp Leu Ala Phe Ala Gly Gly Ala
 325 330 335
 Trp Lys Trp Ile Gly Phe Thr Pro His Asn His Phe Ser Arg Leu Val
 340 345 350

1028462_1.TXT

Ala Ile Glu Ala Asn Lys Ala Cys Arg Ala Asn Gln Ile Lys Glu Val
 355 360 365
 Ile Val Thr Gly Trp Gly Asp Asn Gly Gly Glu Thr Ala Gln Phe Ser
 370 375 380
 Ile Leu Pro Ser Leu Gln Ile Trp Ala Glu Leu Ser Tyr Arg Asn Asp
 385 390 395 400
 Leu Asp Gly Leu Ser Ala His Phe Lys Thr Asn Thr Gly Leu Thr Val
 405 410 415
 Glu Asp Phe Met Gln Ile Asp Leu Ala Asn Leu Leu Pro Asp Leu Pro
 420 425 430
 Gly Asn Leu Ser Gly Ile Asn Pro Asn Arg Tyr Val Phe Tyr Gln Asp
 435 440 445
 Ile Leu Cys Pro Ile Leu Asp Gln His Met Thr Pro Glu Gln Asp Lys
 450 455 460
 Pro His Phe Ala Gln Ala Ala Glu Thr Leu Ala Asn Ile Lys Glu Lys
 465 470 475 480
 Ala Gly Asn Tyr Ala Tyr Leu Phe Glu Thr Gln Ala Gln Leu Asn Ala
 485 490 495
 Ile Leu Ser Ser Lys Val Asp Val Gly Arg Arg Ile Arg Gln Ala Tyr
 500 505 510
 Gln Ala Asp Asp Lys Glu Ser Leu Gln Gln Ile Ala Arg Gln Glu Leu
 515 520 525
 Pro Glu Leu Arg Ser Gln Ile Glu Asp Phe His Ala Leu Phe Ser His
 530 535 540
 Gln Trp Leu Lys Glu Asn Lys Val Phe Gly Leu Asp Thr Val Asp Ile
 545 550 555 560
 Arg Met Gly Gly Leu Leu Gln Arg Ile Lys Arg Ala Glu Ser Arg Ile
 565 570 575
 Glu Val Tyr Leu Ala Gly Gln Leu Asp Arg Ile Asp Glu Leu Glu Val
 580 585 590
 Glu Ile Leu Pro Phe Thr Asp Phe Tyr Ala Asp Lys Asp Phe Ala Ala
 595 600 605

1028462_1.TXT

Thr Thr Ala Asn Gln Trp His Thr Ile Ala Thr Ala Ser Thr Ile Tyr
610 615 620

Thr Thr
625

<210> 238
<211> 782
<212> PRT
<213> Streptococcus pneumoniae

<400> 238

Met Ser Asn Ser Phe Val Lys Leu Leu Val Ser Gln Leu Phe Ala Asn
1 5 10 15

Leu Ala Asp Ile Phe Phe Arg Val Thr Ile Ile Ala Asn Ile Tyr Ile
20 25 30

Ile Ser Lys Ser Val Ile Ala Thr Ser Leu Val Pro Ile Leu Ile Gly
35 40 45

Ile Ser Ser Phe Val Ala Ser Leu Leu Val Pro Leu Val Thr Lys Arg
50 55 60

Leu Ala Leu Asn Arg Val Leu Ser Leu Ser Gln Phe Gly Lys Thr Ile
65 70 75 80

Leu Leu Ala Ile Leu Val Gly Met Phe Thr Val Met Gln Ser Val Ala
85 90 95

Pro Leu Val Thr Tyr Leu Phe Val Val Ala Ile Ser Ile Leu Asp Gly
100 105 110

Phe Ala Ala Pro Val Ser Tyr Ala Ile Val Pro Arg Tyr Ala Thr Asp
115 120 125

Leu Gly Lys Ala Asn Ser Ala Leu Ser Met Thr Gly Glu Ala Val Gln
130 135 140

Leu Ile Gly Trp Gly Leu Gly Gly Leu Leu Phe Ala Thr Ile Gly Leu
145 150 155 160

Leu Pro Thr Thr Cys Ile Asn Leu Val Leu Tyr Ile Ile Ser Ser Phe
165 170 175

Leu Met Leu Phe Leu Pro Asn Ala Glu Val Glu Val Leu Glu Ser Glu
180 185 190

1028462_1.TXT

Thr Asn Leu Glu Ile Leu Leu Lys Gly Trp Lys Leu Val Ala Arg Asn
 195 200 205
 Pro Arg Leu Arg Leu Phe Val Ser Ala Asn Leu Leu Glu Ile Phe Ser
 210 215 220
 Asn Thr Ile Trp Val Ser Ser Ile Ile Leu Val Phe Val Thr Glu Leu
 225 230 235 240
 Leu Asn Lys Thr Glu Ser Tyr Trp Gly Tyr Ser Asn Thr Ala Tyr Ser
 245 250 255
 Ile Gly Ile Ile Ile Ser Gly Leu Ile Ala Phe Arg Leu Ser Glu Lys
 260 265 270
 Phe Leu Ala Ala Lys Trp Glu Pro Gln Leu Phe Thr Pro Asn Leu Lys
 275 280 285
 Thr Ile Gln Asn Pro Cys Leu Ser Leu Asp Pro Gly Trp Phe Leu Phe
 290 295 300
 Ser Pro Asn Gly Cys Phe Leu Leu Asp Lys Lys Glu Phe Pro Leu Tyr
 305 310 315 320
 Gly Ile Ser Val Glu Lys Asn Thr Lys Arg Lys Glu Thr His Met Asn
 325 330 335
 Ser Leu Pro Asn His His Phe Gln Asn Lys Ser Phe Tyr Gln Leu Ser
 340 345 350
 Phe Asp Gly Gly His Leu Thr Gln Tyr Gly Gly Leu Ile Phe Phe Gln
 355 360 365
 Glu Leu Phe Ser Gln Leu Lys Leu Lys Glu Arg Ile Ser Lys Tyr Leu
 370 375 380
 Val Thr Asn Asp Gln Arg Arg Tyr Cys Arg Tyr Ser Asp Ser Asp Ile
 385 390 395 400
 Leu Val Gln Phe Leu Phe Gln Leu Leu Thr Gly Tyr Gly Thr Asp Tyr
 405 410 415
 Ala Cys Lys Glu Leu Ser Ala Asp Ala Tyr Phe Pro Lys Leu Leu Glu
 420 425 430
 Gly Gly Gln Leu Ala Ser Gln Pro Thr Leu Ser Arg Phe Leu Ser Arg
 Page 355

435

440

445

Thr Asp Glu Glu Thr Val His Ser Leu Arg Cys Leu Asn Leu Glu Leu
 450 455 460
 Val Glu Phe Phe Leu Gln Phe His Gln Leu Asn Gln Leu Ile Val Asp
 465 470 475 480
 Ile Asp Ser Thr His Phe Thr Thr Tyr Gly Lys Gln Glu Gly Val Ala
 485 490 495
 Tyr Asn Ala His Tyr Arg Ala His Gly Tyr His Pro Leu Tyr Ala Phe
 500 505 510
 Glu Gly Lys Thr Gly Tyr Cys Phe Asn Ala Gln Leu Arg Pro Gly Asn
 515 520 525
 Arg Tyr Cys Ser Glu Glu Ala Asp Ser Phe Ile Thr Pro Val Leu Glu
 530 535 540
 Arg Phe Asn Gln Leu Leu Phe Arg Met Asp Ser Gly Phe Ala Thr Pro
 545 550 555 560
 Lys Leu Tyr Asp Leu Ile Glu Lys Thr Gly Gln Tyr Tyr Leu Ile Lys
 565 570 575
 Leu Lys Lys Asn Thr Val Leu Ser Arg Leu Gly Asp Leu Ser Leu Pro
 580 585 590
 Cys Pro Gln Asp Glu Asp Leu Thr Ile Leu Pro His Ser Ala Tyr Ser
 595 600 605
 Glu Thr Leu Tyr Gln Ala Gly Ser Trp Ser His Lys Arg Arg Val Cys
 610 615 620
 Gln Phe Ser Glu Arg Lys Glu Gly Asn Leu Phe Tyr Asp Val Ile Ser
 625 630 635 640
 Leu Val Thr Asn Met Thr Ser Gly Thr Ser Gln Asp Gln Phe Gln Leu
 645 650 655
 Tyr Arg Gly Arg Gly Gln Ala Glu Asn Phe Ile Lys Glu Met Lys Glu
 660 665 670
 Gly Phe Phe Gly Asp Lys Thr Asp Ser Ser Thr Leu Ile Lys Asn Glu
 675 680 685

1028462_1.TXT

Val Arg Met Met Met Ser Cys Ile Ala Tyr Asn Leu Tyr Leu Phe Leu
690 695 700

Lys His Leu Ala Gly Gly Asp Phe Gln Thr Leu Thr Ile Lys Arg Phe
705 710 715 720

Arg His Leu Phe Leu His Val Val Gly Lys Cys Val Arg Thr Gly Arg
725 730 735

Lys Gln Leu Leu Lys Leu Ser Ser Leu Tyr Ala Tyr Ser Glu Leu Phe
740 745 750

Ser Ala Leu Tyr Ser Arg Ile Arg Lys Val Asn Leu Asn Leu Pro Val
755 760 765

Pro Tyr Glu Pro Pro Arg Arg Lys Ala Ser Leu Met Met His
770 775 780

<210> 239

<211> 693

<212> PRT

<213> Streptococcus pneumoniae

<400> 239

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Val Gly Val Ala Ser Val Val Val Ala Ser Leu Val Met Gly
20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ala Thr Gln Val Pro Thr
35 40 45

Ser Ser Asn Arg Ala Asn Glu Ser Gln Ala Glu Gln Gly Glu Gln Pro
50 55 60

Lys Lys Leu Asp Ser Glu Arg Asp Lys Ala Arg Lys Glu Val Glu Glu
65 70 75 80

Tyr Val Lys Lys Ile Val Gly Glu Ser Tyr Ala Lys Ser Thr Lys Lys
85 90 95

Arg His Thr Ile Thr Val Ala Leu Val Asn Glu Leu Asn Asn Ile Lys
100 105 110

Asn Glu Tyr Leu Asn Lys Ile Val Glu Ser Thr Ser Glu Ser Gln Leu
115 120 125

1028462_1.TXT

Gln Ile Leu Met Met Glu Ser Arg Ser Lys Val Asp Glu Ala Val Ser
 130 135 140
 Lys Phe Glu Lys Asp Ser Ser Ser Ser Ser Ser Asp Ser Ser Thr
 145 150 155 160
 Lys Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn Lys Pro Thr Glu Pro
 165 170 175
 Gly Glu Lys Val Ala Glu Ala Lys Lys Lys Val Glu Glu Ala Glu Lys
 180 185 190
 Lys Ala Lys Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Ile
 195 200 205
 Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Glu Val
 210 215 220
 Lys Lys Ala Glu Leu Glu Leu Val Lys Val Lys Ala Asn Glu Pro Arg
 225 230 235 240
 Asp Glu Gln Lys Ile Lys Gln Ala Glu Ala Glu Val Glu Ser Lys Gln
 245 250 255
 Ala Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Glu Ala
 260 265 270
 Glu Glu Glu Ala Lys Arg Arg Ala Asp Ala Lys Glu Gln Gly Lys Pro
 275 280 285
 Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu Leu Ala Thr Pro Asp
 290 295 300
 Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser Ser Val Gly Glu Glu
 305 310 315 320
 Thr Leu Pro Ser Pro Ser Leu Lys Pro Glu Lys Lys Val Ala Glu Ala
 325 330 335
 Glu Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu
 340 345 350
 Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu
 355 360 365
 Glu Ile Ala Glu Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu Leu
 370 375 380

1028462_1.TXT

Val Lys Glu Glu Ala Lys Glu Pro Arg Asn Glu Glu Lys Val Lys Gln
 385 390 395 400
 Ala Lys Ala Glu Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu
 405 410 415
 Lys Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys
 420 425 430
 Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln Pro Gln
 435 440 445
 Pro Ala Pro Ala Pro Lys Ala Glu Lys Pro Ala Pro Ala Pro Lys Pro
 450 455 460
 Glu Asn Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln
 465 470 475 480
 Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
 485 490 495
 Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
 500 505 510
 Pro Lys Thr Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn
 515 520 525
 Thr Asp Gly Ser Met Ala Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp
 530 535 540
 Tyr Tyr Leu Asn Ser Asn Gly Ala Met Ala Thr Gly Trp Leu Gln Asn
 545 550 555 560
 Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ser Met Ala Thr Gly
 565 570 575
 Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ser
 580 585 590
 Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn
 595 600 605
 Ala Asn Gly Ser Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp
 610 615 620
 Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Val Lys Asp
 625 630 635 640

1028462_1.TXT

Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser Gly Ala Met Lys Ala Ser
645 650 655

Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Ser Gly
660 665 670

Ala Leu Ala Val Asn Thr Thr Val Asp Gly Tyr Gly Val Asn Ala Asn
675 680 685

Gly Glu Trp Val Asn
690

<210> 240
<211> 810
<212> PRT
<213> Streptococcus pneumoniae

<400> 240

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile
100 105 110

Leu His Asp Ser Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly
115 120 125

Phe Ser Tyr Glu Asp Lys Lys Asp Gln Val Lys Ile Ala Ala Leu Arg
130 135 140

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala
145 150 155 160

1028462_1.TXT

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala
 165 170 175
 Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr
 180 185 190
 Thr His Asp Leu Thr Glu Gln Ala Arg Ser Gly Lys Leu Glu Pro Val
 195 200 205
 Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg
 210 215 220
 Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys
 225 230 235 240
 Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val
 245 250 255
 Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn
 260 265 270
 Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn
 275 280 285
 Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile
 290 295 300
 Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr
 305 310 315 320
 Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu
 325 330 335
 Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu
 340 345 350
 Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu
 355 360 365
 Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr
 370 375 380
 Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr
 385 390 395 400
 Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp
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Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys
420 425 430

Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr
645 650 655

1028462_1.TXT

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala
725 730 735

Ser Leu Thr Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu
770 775 780

Leu Leu Lys Gly Asp Leu Val Ala Gly Ser Thr Leu Lys Ile Gly Val
785 790 795 800

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala
805 810

<210> 241

<211> 448

<212> PRT

<213> Streptococcus pneumoniae

<400> 241

Met Lys Ile Leu Pro Phe Ile Ala Arg Gly Thr Ser Tyr Tyr Leu Lys
1 5 10 15

Met Ser Val Lys Lys Leu Val Pro Phe Leu Val Val Gly Leu Met Leu
20 25 30

Ala Ala Gly Asp Ser Val Tyr Ala Tyr Ser Arg Gly Asn Gly Ser Ile
35 40 45

Ala Arg Gly Asp Asp Tyr Pro Ala Tyr Tyr Lys Asn Gly Ser Gln Glu
50 55 60

1028462_1.TXT

Ile Asp Gln Trp Arg Met Tyr Ser Arg Gln Cys Thr Ser Phe Val Ala
 65 70 75 80
 Phe Arg Leu Ser Asn Val Asn Gly Phe Glu Ile Pro Ala Ala Tyr Gly
 85 90 95
 Asn Ala Asn Glu Trp Gly His Arg Ala Arg Arg Glu Gly Tyr Arg Val
 100 105 110
 Asp Asn Thr Pro Thr Ile Gly Ser Ile Thr Trp Ser Thr Ala Gly Thr
 115 120 125
 Tyr Gly His Val Ala Trp Val Ser Asn Val Met Gly Asp Gln Ile Glu
 130 135 140
 Ile Glu Glu Tyr Asn Tyr Gly Tyr Thr Glu Ser Tyr Asn Lys Arg Val
 145 150 155 160
 Ile Lys Ala Asn Thr Met Thr Gly Phe Ile His Phe Lys Asp Leu Asp
 165 170 175
 Gly Gly Ser Val Gly Asn Ser Gln Ser Ser Thr Ser Thr Gly Gly Thr
 180 185 190
 His Tyr Phe Lys Thr Lys Ser Ala Ile Lys Thr Glu Pro Leu Ala Ser
 195 200 205
 Gly Thr Val Ile Asp Tyr Tyr Tyr Pro Gly Glu Lys Val His Tyr Asp
 210 215 220
 Gln Ile Leu Glu Lys Asp Gly Tyr Lys Trp Leu Ser Tyr Thr Ala Tyr
 225 230 235 240
 Asn Gly Ser Tyr Arg Tyr Val Gln Leu Glu Ala Val Asn Lys Asn Pro
 245 250 255
 Leu Gly Asn Ser Val Leu Ser Ser Thr Gly Gly Thr His Tyr Phe Lys
 260 265 270
 Thr Lys Ser Ala Ile Lys Thr Glu Pro Leu Val Ser Ala Thr Val Ile
 275 280 285
 Asp Tyr Tyr Tyr Pro Gly Glu Lys Val His Tyr Asp Gln Ile Leu Glu
 290 295 300
 Lys Asp Gly Tyr Lys Trp Leu Ser Tyr Thr Ala Tyr Asn Gly Ser Arg
 305 310 315 320

1028462_1.TXT

Arg Tyr Ile Gln Leu Glu Gly Val Thr Ser Ser Gln Asn Tyr Gln Asn
325 330 335

Gln Ser Gly Asn Ile Ser Ser Tyr Gly Ser His Ser Ser Ser Thr Val
340 345 350

Gly Trp Lys Lys Ile Asn Gly Ser Trp Tyr His Phe Lys Ser Asn Gly
355 360 365

Ser Lys Ser Thr Gly Trp Leu Lys Asp Gly Ser Ser Trp Tyr Tyr Leu
370 375 380

Lys Leu Ser Gly Glu Met Gln Thr Gly Trp Leu Lys Glu Asn Gly Leu
385 390 395 400

Trp Tyr Tyr Leu Gly Ser Ser Gly Ala Met Lys Thr Gly Trp Tyr Gln
405 410 415

Val Ser Gly Lys Trp Tyr Tyr Ser Tyr Ser Ser Gly Ala Leu Ala Val
420 425 430

Asn Thr Thr Val Asp Gly Tyr Arg Val Asn Ser Asp Gly Glu Arg Val
435 440 445

<210> 242

<211> 150

<212> PRT

<213> Streptococcus pneumoniae

<400> 242

Met Lys Val Ile Phe Leu Ala Asp Val Lys Gly Lys Gly Lys Lys Gly
1 5 10 15

Glu Ile Lys Glu Val Pro Thr Gly Tyr Ala Gln Asn Phe Leu Ile Lys
20 25 30

Lys Asn Leu Ala Lys Glu Ala Thr Ala Gln Ala Val Gly Glu Leu Arg
35 40 45

Gly Lys Gln Lys Ser Glu Glu Lys Ala His Ala Glu Met Ile Ala Glu
50 55 60

Gly Lys Ala Ile Lys Ala Gln Leu Glu Ala Glu Glu Thr Val Val Glu
65 70 75 80

Phe Val Glu Lys Val Gly Pro Asp Gly Arg Thr Phe Gly Ser Ile Thr
85 90 95

1028462_1.TXT

Asn Lys Lys Ile Ala Glu Glu Leu Gln Lys Gln Phe Gly Ile Lys Ile
100 105 110

Asp Lys Arg His Ile Gln Val Gln Ala Pro Ile Arg Ala Val Gly Leu
115 120 125

Ile Asp Val Pro Val Lys Ile Tyr Gln Asp Ile Thr Ser Val Ile Asn
130 135 140

Leu Arg Val Lys Glu Gly
145 150

<210> 243

<211> 392

<212> PRT

<213> Streptococcus pneumoniae

<400> 243

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val
1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala
145 150 155 160

1028462_1.TXT

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile
 165 170 175
 Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys
 180 185 190
 Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala
 195 200 205
 Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala
 210 215 220
 Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu
 225 230 235 240
 Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn
 245 250 255
 Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val
 260 265 270
 Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro
 275 280 285
 Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly
 290 295 300
 Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala
 305 310 315 320
 Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp
 325 330 335
 Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser
 340 345 350
 Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr
 355 360 365
 Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly
 370 375 380
 Phe Val Thr Tyr Ile Tyr Ala Asp
 385 390

<210> 244
 <211> 129

1028462_1.TXT

<212> PRT

<213> Streptococcus pneumoniae

<400> 244

Met Val Lys Arg Arg Ile Arg Arg Gly Thr Arg Glu Pro Glu Lys Val
1 5 10 15Val Val Pro Glu Gln Ser Ser Ile Pro Ser Tyr Pro Val Ser Val Thr
20 25 30Ser Asn Gln Gly Thr Asp Val Ala Val Glu Pro Ala Lys Ala Val Ala
35 40 45Pro Thr Thr Asp Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn
50 55 60Thr Asp Gly Ser Met Ala Thr Gly Trp Val Gln Val Asn Ser Ser Trp
65 70 75 80Tyr Tyr Leu Asn Ser Asn Gly Ser Met Lys Val Asn Gln Trp Phe Gln
85 90 95Val Gly Gly Lys Trp Tyr Tyr Val Asn Thr Ser Gly Glu Leu Ala Val
100 105 110Asn Thr Ser Ile Asp Gly Tyr Arg Val Asn Asp Asn Gly Glu Trp Val
115 120 125

Arg

<210> 245

<211> 46

<212> PRT

<213> Streptococcus pneumoniae

<400> 245

Glu Leu Arg Arg Leu Ser Arg Leu Val Asp Gln Glu Leu Tyr Phe Gly
1 5 10 15Cys Gly Trp Arg Leu Ser Leu Glu Trp Leu Pro Ser Met Arg Lys Asp
20 25 30Ser Trp Pro Ser Asn Thr Ala Pro Arg Thr Thr Met Val Gln
35 40 45

<210> 246

<211> 31

<212> PRT

<213> Streptococcus pneumoniae

<400> 246

Asp Cys Ile Arg Lys Gln Pro Phe Thr Arg Asp Glu Pro Asn Lys Thr
 1 5 10 15

Cys Arg Lys Thr Lys Pro Ser Lys Ser Tyr Cys Ser Tyr Arg Trp
 20 25 30

<210> 247

<211> 26

<212> PRT

<213> Streptococcus pneumoniae

<400> 247

Gly Gln Arg Asn Pro Arg Arg Ile Glu Arg Val Ile Arg Met Ala Glu
 1 5 10 15

Thr Lys Pro Arg Ile Ser Lys Lys Glu Gly
 20 25

<210> 248

<211> 83

<212> PRT

<213> Streptococcus pneumoniae

<400> 248

Gln Arg Lys Leu Phe Lys Ile Phe His Leu Phe Gln Lys Lys Ser Gly
 1 5 10 15

Trp Asn Gln Lys Ser Ser Cys Leu Lys Leu Asn Leu Asn Ser Leu Asn
 20 25 30

Arg Lys Met Thr Gln Met Thr Lys Met Phe Arg Ser Ile Phe Gln Pro
 35 40 45

Lys Lys Pro Leu Asn Thr Asn Phe Gln Ala Tyr Asn Ser Leu His Gln
 50 55 60

Ile Asn Gln Lys Ile Ser Leu Lys Arg Arg Lys Leu Ser Glu Lys Ile
 65 70 75 80

Ser Lys Ser

<210> 249

<211> 104

<212> PRT

<213> Streptococcus pneumoniae

1028462_1.TXT

<400> 249

Leu Val Ile Ile Val Leu Lys Ile Gln Ser Lys Ser Glu Thr Asp Phe
 1 5 10 15

Ile Phe Lys Thr Trp Pro Phe Ile Leu Leu Ser Lys Ile Ile Pro Leu
 20 25 30

Met Val Leu Asp Cys Gln Val Ser Ile Ser Trp Thr Asn Arg Glu Thr
 35 40 45

Val Ala Tyr Ser Lys Leu Leu Ala Ile Lys Thr Leu Lys Gly Asp Tyr
 50 55 60

His Asp Gly Gln Ser Lys Lys Ile Arg Leu Ser His Ala Ser Arg Val
 65 70 75 80

Arg Thr Pro Ser Trp Tyr Pro His Asp Met Ala Asp Ser Thr Arg Ile
 85 90 95

Met Ala Phe Ser Arg Lys Gly Cys
 100

<210> 250

<211> 30

<212> PRT

<213> Streptococcus pneumoniae

<400> 250

Glu Arg Leu Pro Ala Phe Pro Arg Ser Leu Ser Gly Arg Lys Leu Asp
 1 5 10 15

Gln Gly Gly Thr Lys Glu Lys Gly Ser Asp Gly Arg Ser Pro
 20 25 30

<210> 251

<211> 245

<212> PRT

<213> Streptococcus pneumoniae

<400> 251

Arg Asn Cys Leu Ser Thr Trp Lys Ser Ser Ser Asn Tyr His Thr Glu
 1 5 10 15

Ile Lys Arg Gly Thr Val Arg Gln Cys Leu Gly Lys Gly Arg Phe Lys
 20 25 30

Glu Val Tyr Ser Ala Asp Tyr Ala Gln Gln Ser Tyr Glu Asn Asn Arg
 35 40 45

1028462_1.TXT

Lys Arg Ser Val Lys Lys Ser Ser Leu Thr Lys Glu Leu Lys Glu Lys
50 55 60

Ile Leu His Tyr His Asn Gln Lys Phe Ser Pro Glu Met Met Val Met
65 70 75 80

Ala Lys Gly Val Asn Val Gly Ile Ser Thr Ile Tyr Tyr Trp Ile His
85 90 95

His Gly Lys Leu Gly Leu Ser Lys Gln Asp Leu Leu Tyr Pro Arg Lys
100 105 110

Gly Lys Ala Leu Lys Lys Gln Ala Ser Thr Asn Phe Lys Pro Ala Gly
115 120 125

Gln Ser Ile Glu Gln Arg Pro Glu Ala Ile Asn Leu Arg Leu Glu Asn
130 135 140

Gly His Tyr Glu Ile Asp Thr Val Leu Leu Thr Arg Ser Lys Asn Tyr
145 150 155 160

Cys Leu Ile Val Leu Thr Asp Arg Lys Ser Arg His Gln Ile Ile Arg
165 170 175

Leu Ile Pro Asn Lys Ser Ala Glu Val Val Asn Gln Ala Leu Lys Leu
180 185 190

Ile Leu Lys Gln His Lys Ile Leu Ser Ile Thr Ala Asp Asn Gly Thr
195 200 205

Glu Phe Asn Arg Leu Phe Asp Ile Phe Ser Glu Glu His Ile Tyr Tyr
210 215 220

Ala His Pro Tyr Ala Ser Trp Glu Arg Gly Thr Asn Glu Asn His Asn
225 230 235 240

Arg Leu Ile Arg Arg
245

<210> 252
<211> 36
<212> PRT
<213> Streptococcus pneumoniae

<400> 252

Pro Val Met Thr Ile Ser Ser Pro Thr Met Lys Asn Met Asp Leu Ser
1 5 10 15

1028462_1.TXT

Thr Lys Ala Ser Pro Ser Gln Pro Leu Gln Gly Lys His Gly Met Ile
 20 25 30

Trp Ser Gly Lys
 35

<210> 253
 <211> 28
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 253

Thr Ser Ser Ile Arg Ile His Thr Arg Lys Ser Ser Pro Asn Trp Thr
 1 5 10 15

Thr Thr Pro His Leu Ala Leu Ser Ala Glu Thr Asn
 20 25

<210> 254
 <211> 27
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 254

Tyr Phe Leu Pro His Lys Tyr Ala Arg Glu Ser Leu Ser Leu Pro Ser
 1 5 10 15

Thr Asn Lys Ile Leu His Arg Lys Gln Gly Ser
 20 25

<210> 255
 <211> 53
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 255

Ala Ala Phe Lys Lys Asp Gln Ile Asn Glu Arg Val Glu Lys Leu Gly
 1 5 10 15

Lys Leu Lys Pro Ile Thr Ile Asn Tyr Asn Gly Lys Ser Glu Val Ile
 20 25 30

Asp Ser Lys Glu Lys Leu Gln Glu Leu Met Asn Lys Ala Val Lys Asp
 35 40 45

Glu Val Ala Gln Ile
 50

<210> 256

1028462_1.TXT

<211> 33
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 256

Ala Tyr Ala His Ser Lys Arg Ser Ala Gly Ser Gly Arg Ala Gly Gly
 1 5 10 15

Arg Gln Cys Leu Cys Gln Cys Gln Asn Lys Cys Arg Arg Asp Phe Lys
 20 25 30

Tyr

<210> 257
 <211> 36
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 257

His Gly Arg Pro Tyr His Lys Pro His Gln Pro His His His Gly Phe
 1 5 10 15

Pro Gln Gln Ser Tyr Asn Leu Leu Pro Pro Lys His Lys Pro Thr Leu
 20 25 30

Cys Val Arg Arg
 35

<210> 258
 <211> 130
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 258

Lys Gly Lys Ile Leu Leu Leu Pro Arg Leu Thr Thr Gln Arg Trp Gln
 1 5 10 15

Arg Lys Ile Arg Pro Asp Ser Arg Lys Ser Ala Asn Asn Lys Ala Asn
 20 25 30

Leu Asp Phe His Asn Ser Arg Cys Lys Ser Ser Leu Ser Asp Glu Ala
 35 40 45

Pro Asn Leu His Lys Asn Pro Ala Leu Leu Val His Ser Leu Ser Arg
 50 55 60

Val Ile Ala Val Leu Leu Glu Leu Ser Pro Leu Gln Ala Tyr Ser Ile
 65 70 75 80

1028462_1.TXT

Val Lys Phe Ser Pro Lys Glu Asp Asp Leu Ile His Asp Asp Ala Ile
85 90 95

Leu Val Arg Phe Gly Ile Leu Glu Val His Asp Ser Pro Tyr Glu Leu
100 105 110

Leu Leu Leu Tyr His Thr His Ser Tyr Arg Phe Ser Cys Ser Ile Tyr
115 120 125

Leu Ser
130

<210> 259

<211> 144

<212> PRT

<213> Streptococcus pneumoniae

<400> 259

Phe Thr Val Ser His Val Phe Leu Leu Tyr Leu Ser Phe Asn Pro Arg
1 5 10 15

Pro Lys Ser Met Ser Leu Ser Phe Thr Ser Ser Lys Leu Leu Arg Pro
20 25 30

Arg Phe Arg Thr Phe Ile Ile Ser Ala Ser Asp Phe Ser Val Lys Ser
35 40 45

Cys Thr Val Leu Ile Pro Ala Arg Phe Lys Gln Leu Tyr Glu Arg Thr
50 55 60

Asp Lys Ser Ser Ser Ser Ile Val Arg Ser Lys Ile Arg Ser Ser Asp
65 70 75 80

Ser Val Ser Ala Ser Phe Ile Thr Ser Val Asp Leu Ala Ile Ser Val
85 90 95

Arg Phe Val Asn Lys Ser Arg Cys Ser Val Lys Ile Arg Ala Glu Ser
100 105 110

Pro Lys Ala Ser Ser Gly Ile Ile Val Pro Phe Val Lys Ile Ser Arg
115 120 125

Val Asn Leu Ser Lys Pro Ser Leu Leu Pro Thr Arg Ala Gly Ser Thr
130 135 140

<210> 260

<211> 18

<212> PRT

<213> Streptococcus pneumoniae

<400> 260

Leu Val Cys Met Lys Asn Lys Gly Cys Tyr Lys Glu Arg Asn Asn Cys
 1 5 10 15

Cys His

<210> 261

<211> 58

<212> PRT

<213> Streptococcus pneumoniae

<400> 261

Phe His Tyr Leu Ser Lys Tyr Phe Leu Val Ser Ala Ile Thr Thr Gly
 1 5 10 15

Asp Lys Thr Lys Arg Ala Ile Lys Phe Gly Arg Ala Ile Lys Ala Leu
 20 25 30

Thr Ile Ser Ala Ile Ile Gln Thr Ile Ser Asn Ser Ile Asn Pro Pro
 35 40 45

Asn Lys Thr Met Ser Thr Lys Thr Thr Arg
 50 55

<210> 262

<211> 47

<212> PRT

<213> Streptococcus pneumoniae

<400> 262

Gly Lys Lys Val Phe Ile Lys Tyr Pro Leu Ser Arg Val Ser Ser Lys
 1 5 10 15

Thr Gly Pro Met Ile Thr Gly Arg Thr Lys Asp Lys Ile Val Asp Lys
 20 25 30

Lys Val Gly Cys Pro Phe Glu Lys Ser Thr Val Lys Tyr Ser Ser
 35 40 45

<210> 263

<211> 37

<212> PRT

<213> Streptococcus pneumoniae

<400> 263

Ser Ser Pro Val Phe Pro Lys Leu Val Met Val Ser Gly Ala Asn Lys
 1 5 10 15

1028462_1.TXT

Pro Arg Glu Arg Arg Asn Phe Pro Phe Ser Ser Lys Met Ser Phe His
20 25 30

Leu Thr Phe Val Leu
35

<210> 264
<211> 77
<212> PRT
<213> Streptococcus pneumoniae

<400> 264

Tyr Leu Thr Ser Phe Ser Val Pro Lys Ile Ala Ser Ser Lys Val Lys
1 5 10 15

Leu Thr Arg Tyr Trp Arg Ser Ser Pro Trp Arg Gly Ala Phe Gly Leu
20 25 30

Arg Glu Glu Pro Pro Pro Pro Lys Lys Leu Glu Lys Ile Ser Ser Lys
35 40 45

Pro Pro Lys Pro Pro Ala Pro Leu Lys Pro Pro Lys Pro Pro Ala Pro
50 55 60

Pro Lys Pro Pro Leu Ala Pro Ala Ala Pro Tyr Trp Ser
65 70 75

<210> 265
<211> 89
<212> PRT
<213> Streptococcus pneumoniae

<400> 265

Gln Ser Trp Arg Pro Ile Pro Asp Ser Lys Cys Tyr Thr Gln Glu Lys
1 5 10 15

Leu Thr Ile Pro Ile Lys Arg Arg Lys Asp Ile Lys Asp Phe Tyr His
20 25 30

Asn Ser Ile Gln Arg His Lys Asn Ser His Lys Ser His Leu Leu Asp
35 40 45

Ser Tyr Arg Leu Ile Ile Thr Arg Leu Ala Glu Ile Val His Glu Asn
50 55 60

Lys Ile Leu Ile Val Leu Ile Leu Tyr Val Thr Asn Ile Pro Ser Arg
65 70 75 80

1028462_1.TXT

Ser Arg Arg Tyr Glu Val Asn Arg Val
85

<210> 266
<211> 60
<212> PRT
<213> Streptococcus pneumoniae

<400> 266

Leu Phe Arg Phe Tyr Arg Val Ile Val Leu Tyr Arg Gly Trp His Ile
1 5 10 15

Tyr Leu Leu Ile Leu Val Asn Leu Gln Tyr Val Gln Asn Val Phe Arg
20 25 30

Lys Asp Arg Phe Leu Val Arg Gly Ala Gln Pro Phe Phe His Gly Glu
35 40 45

Arg Ser Ala Gly His Leu Val Leu Pro Tyr Val Leu
50 55 60

<210> 267
<211> 60
<212> PRT
<213> Streptococcus pneumoniae

<400> 267

Ile Thr His Pro Pro Leu Asn Pro Glu His Phe Val Ser Arg Val Phe
1 5 10 15

Ser Ser Leu Gly Leu Lys Ser Tyr Gln Pro Lys Asp Asp Arg Phe Leu
20 25 30

Arg Lys Pro Ser Asp Ser Arg His Pro Glu Ser Gly Asn Ser Gly Lys
35 40 45

Trp Gln Val Leu Asn Ser Pro Leu Val Ile Val Lys
50 55 60

<210> 268
<211> 30
<212> PRT
<213> Streptococcus pneumoniae

<400> 268

Thr Leu Ala Lys Ala Val Gly Leu Met Tyr Ser Pro Pro Ile Pro Pro
1 5 10 15

Lys Pro Phe Leu Gly Arg Ile Thr Thr Asp Ser Ser Ser Ile

20

25

30

<210> 269
 <211> 83
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 269

Pro Gly Ser Pro Phe Ser Glu Ile Ser Gly Ala Gly Phe Phe Gly Val
 1 5 10 15

Ala Lys Arg Ile Phe Pro Arg Pro Pro Arg Pro Pro Trp Ala Thr Ile
 20 25 30

Asn Ser Cys Pro Cys Ser Ile Lys Ser Val Lys Thr Leu Pro Val Ser
 35 40 45

Ala Ser Arg Thr Val Val Pro Cys Gly Thr Arg Thr Leu Arg Ser Ser
 50 55 60

Ala Pro Arg Pro Cys Ile Pro Leu Val Ile Pro Phe Ser Pro Glu Ser
 65 70 75 80

Ala Leu Lys

<210> 270
 <211> 111
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 270

Ile Asn Ser Leu Thr Leu Ala Thr Ser Leu Ser Lys Arg Arg Ala Pro
 1 5 10 15

Arg Lys Ala Ser Lys Ala Ser Pro Arg Met Val Ser Arg Leu Arg Pro
 20 25 30

Pro Asp Phe Ser Ser Pro Leu Pro Asn Leu Ile Asn Trp Ser Asn Trp
 35 40 45

Gln Ser Arg Ala Lys Pro Ala Lys Leu Ser Ser Arg Thr Ile Ile Ala
 50 55 60

Arg Ser Phe Asp Arg Ser Pro Ser Gly Phe Leu Gly Tyr Phe Leu Tyr
 65 70 75 80

Arg Tyr Ser Glu Ile Asn Asn Cys Arg Thr Ala Ser Pro Lys Asn Ser
 85 90 95

1028462_1.TXT

Lys Arg Ser Leu Cys Glu Ile Phe Lys Arg Arg Cys Ser Leu Ala
100 105 110

<210> 271
<211> 49
<212> PRT
<213> Streptococcus pneumoniae

<400> 271

Pro Ile Gly Lys Arg Asn Cys Lys Ala Glu Cys Gln Ser His His Leu
1 5 10 15

Leu Glu Lys Gln Lys Thr Phe Gln Ser Arg Lys Thr Lys Arg Tyr Gly
20 25 30

Ala Ser Pro Glu Pro Arg Tyr Arg Glu Ser Arg Lys Pro Arg Leu Ser
35 40 45

Gln

<210> 272
<211> 58
<212> PRT
<213> Streptococcus pneumoniae

<400> 272

Gln Pro Leu Gly His Ser Lys Ala Glu Glu His Glu Thr Ile Cys Ser
1 5 10 15

His Thr Phe Asp Asn His Thr Thr Glu Thr Ile Pro Asn Gln Val Lys
20 25 30

Gly Arg Asp Met Thr Ser Ser Glu Thr Leu Pro Phe Pro Ser Lys Asn
35 40 45

Gln Asn Gln Gly Lys Ala Lys Gln Ile Pro
50 55

<210> 273
<211> 125
<212> PRT
<213> Streptococcus pneumoniae

<400> 273

Pro Cys Ser Leu Pro Asp Tyr Gly Leu Val Gly Ser Gly Tyr His Ser
1 5 10 15

1028462_1.TXT

Cys His Tyr Gln Ser Asn Asp Thr Arg Phe Leu Glu Ser His Gly Asn
20 25 30

Trp Arg Thr Leu Leu Tyr Ser Trp Ser Trp Ile Leu Cys Gln Glu Lys
35 40 45

Thr Leu Phe Pro His Asp Leu Ala Ser Leu Tyr Pro Ser Cys Val Arg
50 55 60

Thr Ser Ile His Arg Tyr Cys Leu Leu His Val Lys Lys Leu Arg Asn
65 70 75 80

Ser Ile Ser Thr Phe Phe Phe Thr His Ile Asp Lys Val Leu Val Gln
85 90 95

Ala His Ile Ile Ser Gln Phe Trp Met Lys Arg Thr Tyr Gln His Ile
100 105 110

Phe Phe Leu Gly Cys Asn Asn Leu Ile Val His Cys Cys
115 120 125

<210> 274

<211> 69

<212> PRT

<213> Streptococcus pneumoniae

<400> 274

Arg Val Lys Asp Asn His Leu Asp Lys Leu Val Lys Ala Leu Leu Lys
1 5 10 15

Arg Arg Ser Ser Thr Gln Tyr Tyr Ile His Gln Leu Leu Arg Lys Met
20 25 30

Ile Arg Leu Tyr Gly His Gln Gln Leu His Asn Asn Ser Glu Ile Leu
35 40 45

Val Tyr Ser Asp Tyr Gly His Val Asp Leu Leu Leu Leu Glu Thr Asn
50 55 60

Lys Ile Pro Val Tyr
65

<210> 275

<211> 40

<212> PRT

<213> Streptococcus pneumoniae

<400> 275

Gln Val Ile Lys Ile Asp Ile Ala Thr Thr Asn Lys Thr Glu Ser Val
Page 380

1 5 15
Lys Ser Gln Ser Glu Arg Glu Lys Lys Arg Leu Thr Ser Ser Asn Ile
20 25 30

Leu Lys Val Arg Gly Arg Pro Ile
35 40

<210> 276
<211> 32
<212> PRT
<213> Streptococcus pneumoniae
<400> 276

Ala Phe Lys Ser Ser Lys Val Pro Ser Leu Asp Pro Ser Ser Thr Lys
1 5 10 15

Thr Tyr Ser Ile Ser Val Ser Lys Ser Gly Ser Lys Ala Ser Arg Ala
20 25 30

<210> 277
<211> 69
<212> PRT
<213> Streptococcus pneumoniae
<400> 277

Asp Lys Thr Asp Pro Leu Ala Arg Lys Leu Pro Asp Lys Ser Lys Pro
1 5 10 15

Ser Thr Ser Phe Cys Thr Lys Ser Leu Ser Pro Val Asn Met Ala Ser
20 25 30

Leu Thr Ser Ala Lys Pro Ser Lys Thr Lys Ala Ser Leu Gly Ile Cys
35 40 45

Ser Pro Ala Asp Lys Arg Met Thr Ser Pro Ser Thr Asn Ser Ser Gly
50 55 60

Leu Arg Ala Thr Ser
65

<210> 278
<211> 38
<212> PRT
<213> Streptococcus pneumoniae
<400> 278

Leu Cys Arg Leu Gln Thr Gln Ala Arg Pro Arg Gly Ser Val Thr Asn
1 5 10 15

1028462_1.TXT

Leu Thr Lys Gln Asn Lys Val Tyr Arg Tyr Leu Asn Tyr Leu Arg Gln
 20 25 30

Thr Gln Leu Ser Ala Met
 35

<210> 279
 <211> 110
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 279

Cys Ile Gln Ser Ile Gly Asn Glu Gly Gln Cys Lys Gly Asn Ser Cys
 1 5 10 15

Tyr Val Gly Lys Glu Ile His Leu Ala Pro Ile Ser Asp Ile Val Gly
 20 25 30

His Lys Gly Lys Glu Glu Gly Asp Asp Gly Asn Asp Asp Gly Arg Gln
 35 40 45

Phe Tyr Leu Phe Leu Ala His Leu Val Gly Ser Ala Phe Leu Arg Ser
 50 55 60

Phe Pro Leu Leu Tyr Ser Lys Gly Ile Asn Glu Glu Gly Asp Gly Ile
 65 70 75 80

Gly Asn Asp Gly Arg Leu Ile Ser Lys Asp Ile Ile Asn Ser Thr Gly
 85 90 95

Gln Asn Gly Ile Asn Asn Thr Lys Val Ile Ser Pro Phe Ala
 100 105 110

<210> 280
 <211> 121
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 280

Thr Ser Thr Lys Leu Val Ile Asp Thr Thr Thr Phe Met Thr Phe Cys
 1 5 10 15

Thr Asn Asn Thr Lys Ser Ser Lys Phe Thr Asn Thr Phe Thr Lys Leu
 20 25 30

Asp Val Gly Thr Thr Thr Arg His Val Gly Cys Asp Gly Asn Gly Thr
 35 40 45

1028462_1.TXT

Thr Leu Thr Ser Ile His Asp Asp Leu Gly Phe Ser Ile Val Val Phe
50 55 60

Gly Ile Gln Asp Phe Val Arg Asn Thr Ser Cys Asn Gln Phe Leu Arg
65 70 75 80

Asn Val Val Thr Ser Phe Asn Arg Tyr Cys Thr Asn Gln Asp Arg Leu
85 90 95

Thr Leu Leu Val Thr Ser Leu Asn Val Phe Asp Asn Arg Phe Lys Leu
100 105 110

Arg Phe Asp Thr Cys Ile Lys Lys Val
115 120

<210> 281
<211> 27
<212> PRT
<213> Streptococcus pneumoniae

<400> 281

Ile Ser Thr Gly Val Pro Thr Cys Ser Met Tyr Pro Leu Leu Lys Thr
1 5 10 15

Ala Ile Leu Ser Asp Lys Val Lys Ala Ser Ser
20 25

<210> 282
<211> 34
<212> PRT
<213> Streptococcus pneumoniae

<400> 282

Leu Ser Thr Met Ser Ser Ile Lys Ser Ile Leu Cys Ser Leu Pro Thr
1 5 10 15

His Thr Ile Phe Ser Lys Ser Ala Ile Ser Pro Lys Arg Gly Ser Thr
20 25 30

Ala Ile

<210> 283
<211> 111
<212> PRT
<213> Streptococcus pneumoniae

<400> 283

Ser Cys Ser Tyr Ser Ser Thr Asn Ser Lys Ala Cys Ser Ile Val Gly
1 5 10 15

1028462_1.TXT

Leu Ser Lys Pro Thr Ile Phe Ile Cys Val Thr Pro Ile Ser Ala Ala
20 25 30

Lys Ala Ile Ser Ser Ala Ser Arg Pro Ala Asn Ser Ser Thr Phe Lys
35 40 45

Cys Val Cys Val Ser Lys Ile Ile Ser Ser Asn Leu Val Phe Tyr Leu
50 55 60

Leu Leu Tyr Gln Lys Arg Gly Gly Ala Pro Asn Phe Ser Val Ser Pro
65 70 75 80

Pro Leu Phe Asn Arg Glu Leu Phe Cys Tyr Leu Phe Tyr Pro Ile Leu
85 90 95

Pro Ile Ser Tyr Ser Thr Val Arg Asp Arg Arg Asp Trp Leu His
100 105 110

<210> 284
<211> 110
<212> PRT
<213> Streptococcus pneumoniae
<400> 284

Val Thr Ser Cys Ile Val Pro Ala Val Ala Cys Gly Ala Leu Val Val
1 5 10 15

Leu Gly Ala Ala Leu Gly Ala Thr Gly Leu Leu Gly Thr Val Thr Met
20 25 30

Ala Met Ala Cys Thr Pro Ile Val Ser Ala Ser Phe Thr Ser Ser Ile
35 40 45

Val Phe Ala Phe Ser Ile Ser Leu Arg Ala Ala Cys Phe Ser Ala Ser
50 55 60

Thr Leu Ala Lys Ser Ser Ala Phe Ser Leu Ser Glu Ser Gly Ala Pro
65 70 75 80

Leu Ile Ser Ser Cys Leu Ser Leu Ala Ala Phe Ser Met Ala Phe Leu
85 90 95

Ala Asp Ser Phe Ser Val Ala Asn Cys Leu Glu Ala Cys Asp
100 105 110

<210> 285
<211> 53

1028462_1.TXT

<212> PRT

<213> Streptococcus pneumoniae

<400> 285

Tyr Ser Pro Phe Asn His Ser Ile Leu Ile Arg Lys Thr Thr Lys Ile
 1 5 10 15

Ile Asn Pro Asn Pro Lys Ala Pro Arg Met Asn Trp Arg Ser Lys Val
 20 25 30

Trp Ser Asn Gln Pro Val Asn Ile Ser Thr Asn His Thr Lys Ser Asp
 35 40 45

Arg Pro Ile Lys Lys
 50

<210> 286

<211> 48

<212> PRT

<213> Streptococcus pneumoniae

<400> 286

Asp Tyr Phe Lys Phe Arg Thr Thr Phe Thr Arg Phe Ser Thr Val Lys
 1 5 10 15

Pro Tyr Ser Ala Asn Thr Phe Gly Ala Gly Ala Glu Ala Pro Lys Val
 20 25 30

Ser Ile Pro Arg Thr Ala Pro Ser Arg Pro Thr Tyr Leu Tyr Gln Phe
 35 40 45

<210> 287

<211> 74

<212> PRT

<213> Streptococcus pneumoniae

<400> 287

Arg Gly Arg Arg Gly Leu Cys Val Ala Arg Ile Lys Ala Pro Arg Leu
 1 5 10 15

Val Ile Lys Pro Lys Arg Thr Ile Asp Pro Pro Thr Lys Asp Arg Tyr
 20 25 30

Ser Pro Pro Leu Ser Ala Thr Ser Leu Ser Val Pro Lys Ser Pro Ile
 35 40 45

Ile Ser Phe Pro Ala Lys Met Asp Lys Asn Pro Lys Arg Lys Leu Asn
 50 55 60

Ser Lys Val Ile Phe Asn Ala Ser Val Thr
65 70

<210> 288
<211> 30
<212> PRT
<213> Streptococcus pneumoniae

<400> 288

Thr Pro Pro Tyr Thr Lys Ile Pro Ala Lys Thr Ala Ile Ile Pro Phe
1 5 10 15

Ile Ser Ala Gln Asp Phe Asn Gln Ala Gln Arg Leu Ser Gly
20 25 30

<210> 289
<211> 1176
<212> DNA
<213> Streptococcus pneumoniae

<400> 289
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gttttaacaa ctgcgcatgc agaaacgact gatgacaaaa ttgctgtctca agataataaa 120
attagtaact taacagcaca acaacaagaa gcccaaaaaa aagttgacca aattcaggag 180
caagtatcag ctattcaagc tgagcagtct aacttgcaag ctgaaaaatga tagattacaa 240
gcagaatcta agaaactcga gggtagagatt acagaacttt ctaaaaacat tgtttctcgt 300
aaccaatcgt tggaaaaaca agctcgtagt gctcaaacaa atggagccgt aactagctat 360
atcaatacca ttgtaaaact aaaaatcaatt acagaagcta ttacagtggt tgctgcaatg 420
agtgaatcgt tatctgcaaa caacaaaatg ttagaacaac aaaaggcaga taaaaaagct 480
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ttaagctctg ctgctgagaa agcgacagct gaaggggaaa aagcaagtct attagagcaa 660
aaagcagcag ctgaggcaga ggctcgtgca gctgaggtag cagaagcagc ttataaagaa 720
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gtgcaagcag tatctgaatc tgcagcagca cctgtccgtg caaaagtctg tccaacatac 840
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ccttgggctg gagactactg gggtaatgga gcacagtggg ctacaagtgc agcagcagca 960
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tatggtcacg tagcggttgt tacagctggt gaatcaacaa cacgtatcca agtatcagaa 1080
tcaattatg caggaatcgt tacaattgga aatcaccgtg gatggttcaa tccaacaaca 1140

actcctgaag gttttgttac atatatttat gcagat 1176

<210> 290
 <211> 1176
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 290
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 attagtaact taacagcaca acaacaagaa gccccaaaac aagttgacca aattcaggag 180
 caagtatcag ctattcaagc tgagcagctt aacttgcaag ctgaaaaatga tagattacaa 240
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 aaccaatcgt tggaaaaaca agctcgtagt gctcaaacaa atggagccgt aactagctat 360
 atcaatacca ttgtaaactc aaaatcaatt acagaagcta ttacacgtgt tgctgcaatg 420
 agtgaaatcg tatctgcaaa caacaaaatg ttagaacaac aaaaggcaga taaaaaagct 480
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 aaattggctg atgatgctca agcattgact acgaaacagg cagaactaaa agctgctgaa 600
 ttaagtcttg ctgctgagaa agcgacagct gaaggggaaa aagcaagtct attagacaa 660
 aaagcagcag ctgaggcaga ggctcgtgca gctgcggtg cagaagcagc ttataaagaa 720
 aaacgagctg gccacaaca atcagtactt gcttcagcaa acactaactt aacagctcaa 780
 gtgcaagcag tatctgaatc tgcagcagca cctgtccgtg caaaagtctg tccaacatac 840
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 ccttgggctg gagactactg gggtaattgga gcacagtggg ctacaagtgc agcagcagca 960
 ggtttccgta cagggttaac acctcaagtt ggagcaattg catgttgtaa tgatggtgga 1020
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 tcaaattatg caggtaatcg tacaattgga aatcacctg gatggttcaa tccaacaaca 1140
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<210> 291
 <211> 1761
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 291
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 gtgaagggtc tgaggaccaa ctaccagacg gacccgatag ctgtagctcg ttttcagcgt 180
 gaagcgagag ctatggcaga tctagaccat cctcatatcg ttcggataac agatattggc 240

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ctcttggcta	tgcgcttggc	ccatactcga	ggaattgttc	acagggactt	gaaacctcaa	420
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gctagtga	aggtggaaga	agggcggtt	atccgtacag	atcctggcgc	tggaactggt	1260
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<210> 292
 <211> 1977
 <212> DNA
 <213> Streptococcus pneumoniae

<400>	292					
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gtgaagggtc	tgaggaccaa	ctaccagacg	gacccgatag	ctgtagctcg	ttttcagcgt	180
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caaattgttg	ggattaagga	agctaata	gaagttgtag	aagtgacgac	agcgctgca	1860
ggtagttag	aaggcatggt	tggtgaacaa	agtcctagag	caggtgaaaa	ggtagacct	1920
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1028462_1.TXT

<210> 293
 <211> 1977
 <212> DNA
 <213> Streptococcus pneumoniae

<400> 293
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 gtgaagggtc tgaggaccaa ctaccagacg gacccgatag ctgtagctcg ttttcagcgt 180
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<212> DNA

<213> Streptococcus pneumoniae

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<211> 2106

<212> DNA

<213> Streptococcus pneumoniae

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agaagtgaga	atacccccac	ggttacatct	agtggggatg	aagtcgatga	atatataaaa	180
aaaatgttga	gtgagatcca	attagataaa	agaaaacata	cccacaattt	cgccttaaac	240
ctaaagttga	gcagaattaa	aacggagtat	ttgtataaat	taaaaagttaa	tgttttagaa	300

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gaaaagtcaa aagctgagtt gacgtcaaaa acaaaaaaag aggtagacgc agcttttgag	360
aagtttaaaa aagatacatt gaaactagga gaaaaggtag cagaagcaca gaagaagggt	420
gaagaagcta agaaaaaagc caaggatcaa aaagaagaag atcaccgtaa ctaccaaac	480
aatacttaca aaacgcttag acttgaaatt gctgagtcg atgtgaaagt taaagaagcg	540
gagcttgac tattgaaaga ggaagctaaa actcgaaagc aggacacaat taaccaagca	600
aaagcgaaag ttaagagtga acaagctgag gctacaaggt taaaaaaat caagacagat	660
cgtagaacaag ctgaggctac annnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn	720
nattgctgag tccgatgtga aagttaaga agcggagctt gaactagtaa aagaggaagc	780
taaggaacct cgagacgag gaaaaattaa gcaagcaaaa gcggaagttg agagtaaaca	840
agctgaggct acaagggttag aaaaaatcaa gacagatcgt aaaaagcag aagaagaagc	900
taaacgaaaa gcagcagaag aagataaagt taaagaaaa ccagctgaac aaccacaacc	960
agcgccggct cctcaaccag aaaaaccaac tccaaaacca gaaaaccag ctccagctcc	1020
aaaaccagag aatccagctg aacaacaaaa agcagaaaaa ccagctgac aacaagctga	1080
agaagactat gctcgtagat cagaagaaga atataatcgc ttgactcaac agcaaccgcc	1140
aaaaactgaa aaaccagcac aaccatctac tccaaaaaca ggctggaac aagaaaacgg	1200
tatgtggtac ttctacaata ctgatggtc aatggcgaca ggatggctcc aatacaatgg	1260
ctcatggtac tacctaaacg ctaatggtga tatggcgaca ggatggctcc aaaacaatgg	1320
ttcatggtac tacctaaacg ctaatggtga tatggcgaca ggatggctcc aaaacaatgg	1380
ctcatggtac tacctaaacg ctaatggtga tatggcgaca ggatggctcc aaaacaatgg	1440
ctcatggtac tacctaaacg ctaatggtga tatggcgaca ggatgggtga aagatggaga	1500
tacctggtac tatcttgaag catcaggtgc tatgaaagca agccaatggt tcaaagcatc	1560
agataaatgg tactatgtca atggctcagg tgcccttgca gtcaacacaa ctgtagatgg	1620
ctatggagtc aatgccaat gtgaatgggt aaac	1654

<210> 301
 <211> 1751
 <212> DNA
 <213> Streptococcus pneumoniae

<220>
 <221> misc_feature
 <222> (722)..(761)
 <223> n represents undefined/missing nucleotides due to unavailable sequencing information.

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gtagctagtg tagctgttgc cagtcttgtt atgggaagtg tgggtcatgc gacagagaag	120

1028462_1.TXT

gaggtaacta	cccaagtacc	cacttattct	aatatggcaa	agacagaaca	taggaaagct	180
gctaaacaag	tcgtcgatga	atatatagaa	aaaatgttga	gggagattca	attagataga	240
agaaaacata	cccaaaattt	cgccctcaac	atgaagtgtga	gcgcaattaa	aacggagtat	300
ttgtatggat	taaaagagaa	gtcgggaagct	gagttgccgt	catcgggaagc	tgagttgccg	360
tcagaagtaa	aagcaaagtt	agacgcagct	tttgagcagt	ttaaaaaaga	tacattgaaa	420
ctaggagaaa	aggtagcaga	agctgagaag	aaggttgacg	aagctgagaa	aaaagccaag	480
gctcaaaaag	aagaagatcg	ccgtaactac	ccaaccatta	cttacaaaac	gcttgacctt	540
gaaattgtcg	agtcgcatgt	ggaagttaaa	aaagcggagc	ttgaactatt	gaaagaggaa	600
gctaaaaact	gaaacaagga	cacaattaag	caagcaaaag	cgaaagtgtga	gagtaaaaaa	660
gctgaggcta	caaagttaga	agaaatcaag	acagatcgta	aaaaagcaga	agaagaagct	720
annnnnnnnn	nnnnnnnnnn	nnnnnnnnnn	nnnnnnnnnn	nattgctgag	tccgatgtga	780
aagttaaaga	agcggagctt	gaactagtaa	aagaggaagc	taaggaatct	cgaaacgagg	840
aaaaagttaa	gcaagcaaaa	gcgaaagttg	agagtaaaaa	agctgaggct	acaaggttag	900
aaaaaatcaa	gacagatcgt	aaaaaagcag	agaaggttaa	acgaagagca	gcagaagaag	960
ataaagttaa	agaaaaacca	gctgaacaac	cacaaccagc	gccggctcct	caaccagaaa	1020
aaccaactga	agagccttag	aatccagctc	cagctccaaa	acctgagaaa	ccagctgaac	1080
aacaaaaagc	agaaaaacca	gctgatcaac	aagctgaaga	agactatgct	cgtagatcag	1140
aagaagaata	taatcgcttg	actcaacagc	aaccgccaaa	aactgaaaaa	ccagcacaac	1200
catctactcc	aaaaacaggc	tggaaacaag	aaaacggtat	gtggtacttc	tacaatactg	1260
atggttcaat	ggcgacagga	tggctccaaa	acaatggctc	atggtactac	ctcaacagca	1320
atggcgctat	ggcgacagga	tggctccaat	acaatggctc	atggtactac	ctcaacgcta	1380
atggtgatat	ggcgacagga	tggctccaaa	acaatggctc	atggtactac	ctcaacgcta	1440
atggtgatat	ggcgacagga	tggctccaat	acaatggctc	atggtactac	ctcaacgcta	1500
atggtgatat	ggcgacagga	tggctccaaa	acaatggctc	atggtactac	ctaaacgcta	1560
atggtgatat	ggcgacaggt	tgggtgaaag	atggagatac	ctggtactat	cttgaagcat	1620
caggtgctat	gaaagcaagc	caatggttca	aagtatcaga	taaatggtac	tatgtcaatg	1680
gctcaggtgc	ccttgacgtc	aacacaactg	tagatggcta	tggagtcaat	gccaatgggt	1740
aatgggtaac	c					1751

<210> 302
 <211> 1699
 <212> DNA
 <213> Streptococcus pneumoniae
 <220>

<221> misc_feature
 <222> (742)..(781)
 <223> n represents undefined/missing nucleotides due to unavailable sequencing information.

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<400> 302
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agaagtgaga atacccccaa ggttacatct agtggggatg aagtcgatga atatataaaa      180
aaaatgttga gtgagatcca attagataaa agaaaacata cccacaattt gcgccttaaac     240
ctaaagttaga gcagaattaa aacggagtat ttgtataaat taaaagttaa tgttttagaa     300
gaaaagtcaa aagctgagtt gacgtcaaaa acaaaaaaag aggtagacgc agctttttgag     360
aagtttaaaa aagatacatt gaaactagga gaaaaggtag cagaagctca gaagaagggt      420
gaagaagcta agaaaaaagc caaggatcaa aaagaagaag atcaccgtaa ctaccaaac       480
aatacttaca aaacgcttga acttgaaatt gctgagtcgg atgtgaaagt taaagaagcg      540
gagcttgaac tattgaaaga ggaagctaaa actcgaaacg aggacacaat taaccaagca      600
aaagcgaaag ttaagagtga acaagctgag gctacaaggt taaaaaaat caagacagat      660
cgtgaacaag ctgaggtcac aagggttagaa aacatcaaga cagatcgtga aaaagcagaa     720
gaagctaaac gaaaagcaga annnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn     780
ncttgaaatt gctgagtcgg atgtgaaagt taaagaagcg gagcttgaac tagtaaaaga     840
ggaagctaag gaatctcgaa acgaggaaaa agttaagcaa gcaaaagcga aagttgagag     900
taacaagctt gaggtcacaa ggttagaaaa aatcaagaca gatcgtaaaa aagcagaaga     960
agaagctaaa cgaaaagcag cagaagaaga taaagttaa gaaaaaccag ctgaacaacc    1020
acaaccagcg ccggctcctc aaccagaaaa accagctcca gtcctcaaac cagagaatcc    1080
agctgaacaa ccaaaagcag aaaaaccagc tgatcaacaa gctgaagaag actatgctcg    1140
tagatcagaa gaagaatata atcgcttgac tcaacagcaa ccgccaaaaa ctgaaaaaac    1200
agcacaacca tctactccaa aaacagggtg gaaacaagaa aacggtatgt ggtacttcta    1260
caatactgat ggttcaatgg cgacaggatg gctccaatac aatggctcat ggtactacct    1320
aaacgctaot ggtgatatgg cgacaggatg gctccaaaaa aatggctcat ggtactacct    1380
aaacgctaot ggtgatatgg cgacaggatg gctccaaaaa aatggctcat ggtactacct    1440
aaacgctaot ggtgatatgg cgacaggatg gctccaaaaa aatggctcat ggtactacct    1500
aaacgctaot ggtgatatgg cgacagggtg ggtgaaagat ggagatacct ggtactatct    1560
tgaagcatca ggtgctatga aagcaagcca atggttcaaa gcatcagata aatggtacta    1620
tgtcaatgpc tcaggtgccc ttgcagtcaa cacaactgta gatggctatg gagtcaatgc    1680
caatggtgaa tgggtaaac                                     1699

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<210> 303
<211> 1413
<212> DNA
<213> Streptococcus pneumoniae

<220>
<221> misc_feature
<222> (669)..(708)
<223> n represents undefined/missing nucleotides due to unavailable sequencing
information.

<400> 303
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gaggtaaact cccaagtagc cacttcttct aataaggcaa ataaaagtca gacagaaact      180
atgaaagctg ctaacaagtg cgatgaatat ataaaaaaa agctccaatt agatagaaga      240
aaacataccc aaaatgtcgg cttactcaca aagttggcgg taattaaaac ggagtatttg      300
catggattaa gtgtttcaaa aaagaagtcg gaagctgagt tgccgtcaga aataaaagca      360
aagttagacg cagcttttga gcagtttaaa aaagatacat taccaacaga accaggaaaa      420
aaggtagcag aagctgagaa gaaggttgaa gaagctaaga aaaaagccga ggatcaaaaa      480
gaaaaagatc tccgtaacta cccaaccaat acttacaaaa cgcttgaact tgacattgct      540
gagtcgcatg tggaaagttaa aaaagcggag cttgaactag taaaagggag ctacaggaat      600
ctcgagacga gaaaaaaatt aatcaagcaa agcgaaaagt tgagaataaa aaagctgatg      660
ctacaaggnn nnnnnnnnnn nnnnnnnnnn nnnnnnnngt ccaaaaacggt      720
atgtgttact tctacaatac tgatggttca atggcaacag gctggctcca aaacaatggc      780
tcattgttact acctcaacag caatggcgct atggcgacag gatggctcca aaacaatggc      840
tcattgttact acctcaacag caatggcgct atggcgacag gatggctcca atacaatggt      900
tcattgttact acctcaacgc taatggtgat atggcgacag gatggttcca atacaatggt      960
tcattgttact acctcaacgc taatggtgat atggcgacag gatggttcca atacaatggt      1020
tcattgttact acctcaacgc taatggtgat atggcgacag gatggttcca atacaatggt      1080
tcattgttact acctcaacgc taatggtgat atggcgacag gatggttcca atacaatggt      1140
tcattgttact acctaaacag caatggtgct atggtaacag gatggttcca aaacaatggc      1200
tcattgttact acctaaacgc taacggttca atggcaacag attgggtgaa agatggagat      1260
acctgttact atcttgaagc atcaggtgct atgaaagcaa gccaatggtt caaagtatca      1320
gataaatggt actatgtcaa tggctcaggt gcccttgcag tcaacacaac tgtagatagc      1380
tatagagtca atgccaatgg tgaatgggta aac                                1413

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<210> 304

<211> 392

<212> PRT

<213> Streptococcus pneumoniae

<400> 304

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Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala
210 215 220

1028462_1.TXT

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu
 225 230 235 240

Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn
 245 250 255

Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val
 260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro
 275 280 285

Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly
 290 295 300

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala
 305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp
 325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser
 340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr
 355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Pro Glu Gly
 370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp
 385 390

<210> 305

<211> 392

<212> PRT

<213> Streptococcus pneumoniae

<400> 305

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val
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Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp
 20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln
 35 40 45

1028462_1.TXT

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala
 50 55 60
 Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln
 65 70 75 80
 Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn
 85 90 95
 Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln
 100 105 110
 Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys
 115 120 125
 Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val
 130 135 140
 Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala
 145 150 155 160
 Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile
 165 170 175
 Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys
 180 185 190
 Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala
 195 200 205
 Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala
 210 215 220
 Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu
 225 230 235 240
 Lys Arg Ala Gly Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn
 245 250 255
 Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val
 260 265 270
 Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro
 275 280 285
 Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly
 290 295 300

1028462_1.TXT

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala
305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp
325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser
340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr
355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly
370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp
385 390

<210> 306

<211> 587

<212> PRT

<213> Streptococcus pneumoniae

<400> 306

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys
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Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu
100 105 110

Ala Ala Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His
115 120 125

1028462_1.TXT

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Gly Gly Ser Lys Ala Thr Val Gln
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser
260 265 270

Leu Ser Tyr Asn Arg Arg Asn Glu Ser Lys Leu Ile Phe Asp Glu Thr
275 280 285

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala
355 360 365

Thr Ile Ala Ile Pro Asp Val Ala Gly Gln Thr Val Ala Glu Ala Lys
370 375 380

1028462_1.TXT

Ala Thr Leu Lys Lys Ala Asn Phe Glu Ile Gly Glu Glu Lys Thr Glu
385 390 395 400

Ala Ser Glu Lys Val Glu Glu Gly Arg Ile Ile Arg Thr Asp Pro Gly
405 410 415

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser
435 440 445

Ser Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu
450 455 460

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Val Thr Ser Val Ala Met
500 505 510

Pro Ser Tyr Ile Gly Ser Ser Leu Glu Phe Thr Lys Asn Asn Leu Ile
515 520 525

Gln Ile Val Gly Ile Lys Glu Ala Asn Ile Glu Val Val Glu Val Thr
530 535 540

Thr Ala Pro Ala Gly Ser Ala Glu Gly Met Val Val Glu Gln Ser Pro
545 550 555 560

Arg Ala Gly Glu Lys Val Asp Leu Asn Lys Thr Arg Val Lys Ile Ser
565 570 575

Ile Tyr Lys Pro Lys Thr Thr Ser Ala Thr Pro
580 585

<210> 307

<211> 659

<212> PRT

<213> Streptococcus pneumoniae

<400> 307

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys
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1028462_1.TXT

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu
 20 25 30
 Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr
 35 40 45
 Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala
 50 55 60
 Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly
 65 70 75 80
 Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu
 85 90 95
 Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu
 100 105 110
 Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His
 115 120 125
 Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu
 130 135 140
 Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala
 145 150 155 160
 Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val
 165 170 175
 His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln
 180 185 190
 Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly
 195 200 205
 His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His
 210 215 220
 Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro
 225 230 235 240
 Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr
 245 250 255
 Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser

Leu Ser Tyr Asn Arg Arg Asn Glu Ser Lys Leu Ile Phe Asp Glu Thr
 275 280
 Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu
 290 295
 Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys
 305 310 315
 Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro
 325 330 335
 Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu
 340 345 350
 Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala
 355 360 365
 Thr Ile Ala Ile Pro Asp Val Ala Gly Gln Thr Val Ala Glu Ala Lys
 370 375 380
 Ala Thr Leu Lys Lys Ala Asn Phe Glu Ile Gly Glu Glu Lys Thr Glu
 385 390 395 400
 Ala Ser Glu Lys Val Glu Glu Gly Arg Ile Ile Arg Thr Asp Pro Gly
 405 410 415
 Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser
 420 425 430
 Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser
 435 440 445
 Ser Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu
 450 455 460
 Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val
 465 470 475 480
 Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala
 485 490 495
 Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu
 500 505 510

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Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala
 595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu
 610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser
 645 650 655

Ala Thr Pro

<210> 308

<211> 659

<212> PRT

<213> Streptococcus pneumoniae

<400> 308

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys
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Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu
 20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr
 35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala
 50 55 60

1028462_1.TXT

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly
 65 70 75 80
 Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu
 85 90 95
 Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu
 100 105 110
 Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His
 115 120 125
 Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu
 130 135 140
 Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala
 145 150 155 160
 Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val
 165 170 175
 His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln
 180 185 190
 Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly
 195 200 205
 His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His
 210 215 220
 Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro
 225 230 235 240
 Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr
 245 250 255
 Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser
 260 265 270
 Leu Ser Tyr Asn Arg Arg Asn Glu Ser Lys Leu Ile Phe Asp Glu Thr
 275 280 285
 Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu
 290 295 300
 Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys
 305 310 315 320

1028462_1.TXT

Asn Pro Ser Arg Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro
 325 330 335
 Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu
 340 345 350
 Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala
 355 360 365
 Thr Ile Ala Ile Pro Asp Val Ala Gly Gln Thr Val Ala Glu Ala Lys
 370 375 380
 Ala Thr Leu Lys Lys Ala Asn Phe Glu Ile Gly Glu Glu Lys Thr Glu
 385 390 395 400
 Ala Ser Glu Lys Val Glu Glu Gly Arg Ile Ile Arg Thr Asp Pro Gly
 405 410 415
 Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser
 420 425 430
 Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser
 435 440 445
 Ser Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu
 450 455 460
 Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val
 465 470 475 480
 Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala
 485 490 495
 Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu
 500 505 510
 Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys
 515 520 525
 Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser
 530 535 540
 Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly
 545 550 555 560
 Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala
 565 570 575

1028462_1.TXT

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu
625 630 635 640

Asn Lys Thr Arg Val Lys Thr Ser Ile Tyr Lys Pro Lys Thr Thr Ser
645 650 655

Ala Thr Pro

<210> 309

<211> 659

<212> PRT

<213> Streptococcus pneumoniae

<400> 309

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His
115 120 125

1028462_1.TXT

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu
 130 135 140
 Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala
 145 150 155 160
 Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val
 165 170 175
 His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln
 180 185 190
 Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly
 195 200 205
 His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His
 210 215 220
 Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro
 225 230 235 240
 Gln Ala Leu Glu Asn Val Ile Ile Arg Ala Thr Ala Lys Lys Leu Thr
 245 250 255
 Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser
 260 265 270
 Leu Ser Tyr Asn Arg Arg Asn Glu Ser Lys Leu Ile Phe Asp Glu Thr
 275 280 285
 Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu
 290 295 300
 Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Gly His Lys Ser Ile Lys
 305 310 315 320
 Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro
 325 330 335
 Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu
 340 345 350
 Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala
 355 360 365
 Thr Ile Ala Ile Pro Asp Val Ala Gly Gln Thr Val Ala Glu Ala Lys
 Page 414

370

375

Ala Thr Leu Lys Lys Ala Asn Phe Glu Ile Gly Glu Glu Lys Thr Glu
385 390 395 400

Ala Ser Glu Lys Val Glu Glu Gly Arg Ile Ile Arg Thr Asp Pro Gly
405 410 415

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser
420 425 430

Ser Gly Lys Lys Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser
435 440 445

Ser Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu
450 455 460

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala
485 490 495

Thr Gln Ile Ile Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu
610 615 620

1028462_1.TXT

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser
 645 650 655

Ala Thr Pro

<210> 310
 <211> 659
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 310

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys
 1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu
 20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr
 35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala
 50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly
 65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu
 85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu
 100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His
 115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu
 130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala
 145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val
 165 170 175

1028462_1.TXT

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln
 180 185 190
 Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly
 195 200 205
 His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His
 210 215 220
 Phe Gln Asn Pro Leu Pro Ser Val Ile Ala Glu Asn Ser Ser Val Pro
 225 230 235 240
 Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr
 245 250 255
 Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser
 260 265 270
 Leu Ser Tyr Asn Arg Arg Asn Glu Ser Lys Leu Ile Phe Asp Glu Thr
 275 280 285
 Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu
 290 295 300
 Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys
 305 310 315 320
 Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro
 325 330 335
 Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu
 340 345 350
 Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala
 355 360 365
 Thr Ile Ala Ile Pro Asp Val Ala Gly Gln Thr Val Ala Glu Ala Lys
 370 375 380
 Ala Thr Leu Lys Lys Ala Asn Phe Glu Ile Gly Glu Glu Lys Thr Glu
 385 390 395 400
 Ala Ser Glu Lys Val Glu Glu Gly Arg Ile Ile Arg Thr Asp Pro Gly
 405 410 415
 Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser
 420 425 430

1028462_1.TXT

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser
 435 440 445

Ser Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu
 450 455 460

Ile Lys Ile Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala
 595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu
 610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser
 645 650 655

Ala Thr Pro

<210> 311
 <211> 701

<212> PRT

<213> Streptococcus pneumoniae

<400> 311

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
20 25 30Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr
35 40 45Ser Ser Asn Met Ala Lys Thr Glu His Arg Lys Ala Ala Lys Gln Val
50 55 60Val Asp Glu Tyr Ile Glu Lys Met Leu Arg Glu Ile Gln Leu Asp Arg
65 70 75 80Arg Lys His Thr Gln Asn Val Ala Leu Asn Ile Lys Leu Ser Ala Ile
85 90 95Lys Thr Lys Tyr Leu Arg Glu Leu Asn Val Leu Glu Glu Lys Ser Lys
100 105 110Asp Glu Leu Pro Ser Glu Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu
115 120 125Lys Phe Lys Lys Asp Thr Leu Lys Pro Gly Glu Lys Val Ala Glu Ala
130 135 140Lys Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu
145 150 155 160Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu
165 170 175Glu Ile Ala Glu Phe Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu
180 185 190Val Lys Glu Glu Ala Lys Glu Ser Arg Asn Glu Gly Thr Ile Lys Gln
195 200 205Ala Lys Glu Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu
210 215 220Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys
225 230 235 240

1028462_1.TXT

Ala Asp Ala Lys Leu Lys Glu Ala Asn Val Ala Thr Ser Asp Gln Gly
 245 250 255
 Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu Leu Ala Thr
 260 265 270
 Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser Ser Val Gly
 275 280 285
 Glu Glu Thr Leu Pro Ser Ser Ser Leu Lys Ser Gly Lys Lys Val Ala
 290 295 300
 Glu Ala Glu Lys Lys Val Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln
 305 310 315 320
 Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu
 325 330 335
 Asp Leu Glu Ile Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu
 340 345 350
 Glu Leu Val Lys Glu Glu Ala Lys Glu Pro Arg Asp Glu Glu Lys Ile
 355 360 365
 Lys Gln Ala Lys Ala Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg
 370 375 380
 Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys
 385 390 395 400
 Arg Lys Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln
 405 410 415
 Pro Gln Pro Ala Pro Ala Thr Gln Pro Glu Lys Pro Ala Pro Lys Pro
 420 425 430
 Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln
 435 440 445
 Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
 450 455 460
 Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
 465 470 475 480
 Pro Lys Thr Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn
 Page 420

Thr Asp Gly Ser Met Ala Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp
500 505 510

Tyr Tyr Leu Asn Ala Asn Gly Ala Met Ala Thr Gly Trp Leu Gln Asn
515 520 525

Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ser Met Ala Thr Gly
530 535 540

Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ala
545 550 555 560

Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn
565 570 575

Ser Asn Gly Ala Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp
580 585 590

Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Asn
595 600 605

Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly
610 615 620

Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp
625 630 635 640

Met Ala Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu
645 650 655

Ala Ser Gly Ala Met Lys Ala Ser Gln Trp Phe Lys Val Ser Asp Lys
660 665 670

Trp Tyr Tyr Val Asn Gly Ser Gly Ala Leu Ala Val Asn Thr Thr Val
675 680 685

Asp Gly Tyr Gly Val Asn Ala Asn Gly Glu Trp Val Asn
690 695 700

<210> 312
<211> 536
<212> PRT
<213> Streptococcus pneumoniae

<220>
<221> MISC_FEATURE
<222> (164)..(213)

1028462_1.TXT

<223> Xaa represents undefined/missing amino acids due to unavailable sequencing information.

<400> 312

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Val Gly Val Ala Ser Val Val Val Ala Ser Leu Val Met Gly
20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ala Thr Gln Val Pro Thr
35 40 45

Ser Ser Asn Arg Ala Asn Glu Ser Gln Ala Glu Gln Gly Glu Gln Pro
50 55 60

Lys Lys Leu Asp Ser Glu Arg Asp Lys Ala Arg Lys Glu Val Glu Glu
65 70 75 80

Tyr Val Lys Lys Ile Val Gly Glu Ser Tyr Ala Lys Ser Thr Lys Lys
85 90 95

Arg His Thr Ile Thr Val Ala Leu Val Asn Glu Leu Asn Asn Ile Lys
100 105 110

Asn Glu Tyr Leu Asn Lys Ile Val Glu Ser Thr Ser Glu Ser Gln Leu
115 120 125

Gln Ile Leu Met Met Glu Ser Arg Ser Lys Val Asp Glu Ala Val Ser
130 135 140

Lys Phe Glu Lys Asp Ser Pro Ser Ser Ser Ser Ser Asp Ser Ser Thr
145 150 155 160

Lys Pro Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
165 170 175

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
180 185 190

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
195 200 205

Xaa Xaa Xaa Xaa Xaa Ala Glu Ser Asp Val Glu Val Lys Lys Ala Glu
210 215 220

Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Pro Arg Asn Glu Glu Lys
225 230 235 240

1028462_1.TXT

Val Lys Gln Ala Lys Ala Glu Val Glu Ser Lys Lys Ala Glu Ala Thr
 245 250 255
 Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala
 260 265 270
 Lys Arg Lys Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu
 275 280 285
 Gln Pro Gln Pro Ala Pro Ala Pro Lys Ala Glu Lys Pro Ala Pro Ala
 290 295 300
 Pro Lys Pro Glu Asn Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro Ala
 305 310 315 320
 Asp Gln Gln Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr
 325 330 335
 Asn Arg Leu Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln
 340 345 350
 Pro Ser Thr Pro Lys Thr Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr
 355 360 365
 Phe Tyr Asn Thr Asp Gly Ser Met Ala Thr Gly Trp Leu Gln Asn Asn
 370 375 380
 Gly Ser Trp Tyr Tyr Leu Asn Ser Asn Gly Ala Met Ala Thr Gly Trp
 385 390 395 400
 Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ser Met
 405 410 415
 Ala Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala
 420 425 430
 Asn Gly Ser Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr
 435 440 445
 Tyr Leu Asn Ala Asn Gly Ser Met Ala Thr Gly Trp Leu Gln Tyr Asn
 450 455 460
 Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp
 465 470 475 480
 Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser Gly Ala Met
 Page 423

Lys Ala Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn
500 505 510

Gly Ser Gly Ala Leu Ala Val Asn Thr Thr Val Asp Gly Tyr Gly Val
515 520 525

Asn Ala Asn Gly Glu Trp Val Asn
530 535

<210> 313
<211> 319
<212> PRT
<213> Streptococcus pneumoniae

<220>
<221> MISC_FEATURE
<222> (1)..(51)
<223> Xaa represents undefined/missing amino acids due to un available sequencing
information.

<400> 313

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Leu Lys Leu Leu Ser Pro Met Trp Lys Leu Lys Lys Arg
50 55 60

Ser Leu Thr Ser Lys Glu Glu Ala Lys Lys Pro Leu Asn Glu Gly Thr
65 70 75 80

Ile Arg Gln Ala Lys Ala Glu Val Glu Ser Lys Lys Ala Glu Ala Thr
85 90 95

Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala
100 105 110

Lys Arg Arg Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu
115 120 125

Gln Pro Gln Pro Ala Pro Ala Pro Gln Pro Glu Lys Pro Thr Glu Glu
130 135 140

1028462_1.TXT

Pro Glu Asn Pro Val Pro Ala Pro Lys Pro Glu Lys Pro Ala Glu Gln
145 150 155 160

Pro Lys Pro Glu Lys Pro Ala Glu Gln Pro Lys Pro Glu Lys Pro Ala
165 170 175

Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln Ala Glu Glu Asp
180 185 190

Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu Thr Gln Gln Gln
195 200 205

Pro Gln Lys Pro Glu Gln Pro Ala Pro Ala Pro Lys Ile Gly Trp Lys
210 215 220

Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp Gly Ser Met Ala
225 230 235 240

Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
245 250 255

Gly Ser Met Ala Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr
260 265 270

Leu Glu Ala Ser Gly Ala Met Lys Ala Ser Gln Trp Phe Lys Val Ser
275 280 285

Asp Lys Trp Tyr Tyr Val Asn Gly Ser Gly Ala Leu Ala Val Asn Thr
290 295 300

Thr Val Asp Gly Tyr Gly Val Asn Ala Asn Gly Glu Trp Val Asn
305 310 315

<210> 314
<211> 631
<212> PRT
<213> Streptococcus pneumoniae

<220>
<221> MISC_FEATURE
<222> (253)..(302)
<223> Xaa represents undefined/missing amino acids due to unavailable sequencing information.

<400> 314

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Val Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
Page 425

Ser Val Val His Ala Thr Glu Asn Glu Arg Thr Thr Gln Val Pro Thr
 35 40 45
 Ser Ser Asn Arg Gly Lys Pro Glu Arg Arg Lys Ala Ala Glu Gln Phe
 50 55 60
 Asp Glu Tyr Ile Asn Lys Met Ile Gln Leu Asp Lys Arg Lys His Thr
 65 70 75 80
 Gln Asn Leu Ala Phe Asn Ile Gln Leu Ser Arg Ile Lys Thr Glu Tyr
 85 90 95
 Leu Asn Gly Leu Lys Glu Lys Ser Glu Ala Glu Leu Pro Ser Lys Ile
 100 105 110
 Lys Ala Glu Leu Asp Ala Ala Phe Lys Gln Phe Lys Lys Asp Thr Leu
 115 120 125
 Pro Thr Glu Pro Glu Lys Lys Val Ala Glu Ala Glu Lys Lys Val Glu
 130 135 140
 Glu Ala Glu Lys Lys Val Ala Glu Ala Lys Lys Lys Ala Lys Ala Gln
 145 150 155 160
 Lys Glu Glu Asp His Arg Asn Tyr Pro Thr Ile Thr Tyr Lys Thr Leu
 165 170 175
 Asp Leu Glu Ile Ala Glu Phe Asp Val Lys Val Lys Glu Ala Glu Leu
 180 185 190
 Glu Leu Val Lys Lys Glu Ala Asp Glu Ser Arg Asn Glu Gly Thr Ile
 195 200 205
 Asn Gln Ala Lys Ala Lys Val Glu Ser Glu Lys Ala Glu Ala Thr Arg
 210 215 220
 Leu Lys Lys Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu Glu Glu Ala
 225 230 235 240
 Lys Arg Arg Ala Asp Ala Lys Glu Gln Asp Glu Ser Xaa Xaa Xaa Xaa
 245 250 255
 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 260 265 270

1028462_1.TXT

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 275 280 285

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Ile Ala
 290 295 300

Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu
 305 310 315 320

Glu Ala Lys Glu Ser Arg Asn Glu Glu Lys Ile Lys Gln Ala Lys Ala
 325 330 335

Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys
 340 345 350

Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu
 355 360 365

Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln Pro Gln Pro Ala Pro
 370 375 380

Ala Pro Lys Pro Glu Asn Pro Ala Glu Glu Pro Glu Asn Pro Val Pro
 385 390 395 400

Ala Pro Lys Pro Glu Asn Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro
 405 410 415

Ala Asp Gln Gln Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu
 420 425 430

Tyr Asn Arg Leu Thr Gln Gln Gln Pro Pro Lys Pro Glu Gln Pro Ala
 435 440 445

Pro Ala Pro Lys Ile Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe
 450 455 460

Tyr Asn Thr Asp Gly Ser Met Ala Thr Gly Trp Leu Gln Asn Asn Gly
 465 470 475 480

Ser Trp Tyr Tyr Leu Asn Ser Asn Gly Ala Met Ala Thr Gly Trp Leu
 485 490 495

Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala
 500 505 510

Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
 515 520 525

1028462_1.TXT

Gly Asp Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr
530 535 540

Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly
545 550 555 560

Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Val
565 570 575

Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser Gly Ala Met Lys
580 585 590

Ala Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly
595 600 605

Ser Gly Ala Leu Ala Val Asn Thr Thr Val Asp Gly Tyr Gly Val Asn
610 615 620

Ala Asn Gly Glu Trp Val Asn
625 630

<210> 315

<211> 588

<212> PRT

<213> Streptococcus pneumoniae

<220>

<221> MISC_FEATURE

<222> (228)..(277)

<223> xaa represents undefined/missing amino acids due to unavailable sequencing information.

<400> 315

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Leu Gly
20 25 30

Gly Val Val His Ala Glu Gly Val Arg Ser Glu Asn Thr Pro Lys Val
35 40 45

Thr Ser Ser Gly Asp Glu Val Asp Glu Tyr Ile Lys Lys Met Leu Ser
50 55 60

Glu Ile Gln Leu Asp Lys Arg Lys His Thr His Asn Phe Ala Leu Asn
65 70 75 80

Leu Lys Leu Ser Arg Ile Lys Thr Glu Tyr Leu Tyr Lys Leu Lys Val
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Asn Val Leu Glu Glu Lys Ser Lys Ala Glu Leu Thr Ser Lys Thr Lys
 100 105 110
 Lys Glu Val Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr Leu Lys
 115 120 125
 Leu Gly Glu Lys Val Ala Glu Ala Gln Lys Lys Val Glu Glu Ala Lys
 130 135 140
 Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp His Arg Asn Tyr Pro Thr
 145 150 155 160
 Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Lys
 165 170 175
 Val Lys Glu Ala Glu Leu Glu Leu Leu Lys Glu Glu Ala Lys Thr Arg
 180 185 190
 Asn Glu Asp Thr Ile Asn Gln Ala Lys Ala Lys Val Lys Ser Glu Gln
 195 200 205
 Ala Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Gln Ala
 210 215 220
 Glu Ala Thr Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 225 230 235 240
 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 245 250 255
 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 260 265 270
 Xaa Xaa Xaa Xaa Xaa Ile Ala Glu Ser Asp Val Lys Val Lys Glu Ala
 275 280 285
 Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Pro Arg Asp Glu Glu
 290 295 300
 Lys Ile Lys Gln Ala Lys Ala Glu Val Glu Ser Lys Gln Ala Glu Ala
 305 310 315 320
 Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu
 325 330 335

1028462_1.TXT

Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala
 340 345 350
 Glu Gln Pro Gln Pro Ala Pro Ala Pro Gln Pro Glu Lys Pro Thr Pro
 355 360 365
 Lys Pro Glu Lys Pro Ala Pro Ala Pro Lys Pro Glu Asn Pro Ala Glu
 370 375 380
 Gln Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln Ala Glu Glu Asp Tyr
 385 390 395 400
 Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu Thr Gln Gln Gln Pro
 405 410 415
 Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr Pro Lys Thr Gly Trp
 420 425 430
 Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp Gly Ser Met
 435 440 445
 Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala
 450 455 460
 Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr
 465 470 475 480
 Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Asn Asn
 485 490 495
 Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp
 500 505 510
 Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met
 515 520 525
 Ala Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala
 530 535 540
 Ser Gly Ala Met Lys Ala Ser Gln Trp Phe Lys Ala Ser Asp Lys Trp
 545 550 555 560
 Tyr Tyr Val Asn Gly Ser Gly Ala Leu Ala Val Asn Thr Thr Val Asp
 565 570 575
 Gly Tyr Gly Val Asn Ala Asn Gly Glu Trp Val Asn
 580 585

1028462_1.TXT

<210> 316
 <211> 620
 <212> PRT
 <213> Streptococcus pneumoniae

<220>
 <221> MISC_FEATURE
 <222> (241)..(290)
 <223> xaa represents undefined/missing amino acids due to unavailable sequencing information.

<400> 316

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
 20 25 30

Ser Val Val His Ala Thr Glu Lys Glu Val Thr Thr Gln Val Pro Thr
 35 40 45

Tyr Ser Asn Met Ala Lys Thr Glu His Arg Lys Ala Ala Lys Gln Val
 50 55 60

Val Asp Glu Tyr Ile Glu Lys Met Leu Arg Glu Ile Gln Leu Asp Arg
 65 70 75 80

Arg Lys His Thr Gln Asn Phe Ala Phe Asn Met Lys Leu Ser Ala Ile
 85 90 95

Lys Thr Glu Tyr Leu Tyr Gly Leu Lys Glu Lys Ser Glu Ala Glu Leu
 100 105 110

Pro Ser Ser Glu Ala Glu Leu Pro Ser Glu Val Lys Ala Lys Leu Asp
 115 120 125

Ala Ala Phe Glu Gln Phe Lys Lys Asp Thr Leu Lys Leu Gly Glu Lys
 130 135 140

Val Ala Glu Ala Glu Lys Lys Val Ala Glu Ala Glu Lys Lys Ala Lys
 145 150 155 160

Ala Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Ile Thr Tyr Lys
 165 170 175

Thr Leu Asp Leu Glu Ile Ala Glu Ser Asp Val Glu Val Lys Lys Ala
 180 185 190

Glu Leu Glu Leu Leu Lys Glu Glu Ala Lys Thr Arg Asn Lys Asp Thr
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195

200

205

Ile Lys Gln Ala Lys Ala Lys Val Glu Ser Lys Lys Ala Glu Ala Thr
 210 215 220
 Lys Leu Glu Glu Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala
 225 230 235 240
 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 245 250 255
 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 260 265 270
 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 275 280 285
 Xaa Xaa Ile Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu Glu
 290 295 300
 Leu Val Lys Glu Glu Ala Lys Glu Ser Arg Asn Glu Glu Lys Val Lys
 305 310 315 320
 Gln Ala Lys Ala Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu
 325 330 335
 Glu Lys Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Ala Lys Arg Arg
 340 345 350
 Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln Pro Gln
 355 360 365
 Pro Ala Pro Ala Pro Gln Pro Glu Lys Pro Thr Glu Glu Pro Glu Asn
 370 375 380
 Pro Ala Pro Ala Pro Lys Pro Glu Lys Pro Ala Glu Gln Pro Lys Ala
 385 390 395 400
 Glu Lys Pro Ala Asp Gln Gln Ala Glu Glu Asp Tyr Ala Arg Arg Ser
 405 410 415
 Glu Glu Glu Tyr Asn Arg Leu Thr Gln Gln Gln Pro Pro Lys Thr Glu
 420 425 430
 Lys Pro Ala Gln Pro Ser Thr Pro Lys Thr Gly Trp Lys Gln Glu Asn
 435 440 445

1028462_1.TXT

Gly Met Trp Tyr Phe Tyr Asn Thr Asp Gly Ser Met Ala Thr Gly Trp
 450 455 460

Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ser Asn Gly Ala Met
 465 470 475 480

Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala
 485 490 495

Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr
 500 505 510

Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Tyr Asn
 515 520 525

Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp
 530 535 540

Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met
 545 550 555 560

Ala Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala
 565 570 575

Ser Gly Ala Met Lys Ala Ser Gln Trp Phe Lys Val Ser Asp Lys Trp
 580 585 590

Tyr Tyr Val Asn Gly Ser Gly Ala Leu Ala Val Asn Thr Thr Val Asp
 595 600 605

Gly Tyr Gly Val Asn Ala Asn Gly Glu Trp Val Asn
 610 615 620

<210> 317
 <211> 603
 <212> PRT
 <213> Streptococcus pneumoniae

<220>
 <221> MISC_FEATURE
 <222> (248)..(297)
 <223> Xaa represents undefined/missing amino acids due to unavailable sequencing information.

<400> 317

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Leu Gly
 20 25 30

1028462_1.TXT

Gly Val Val His Ala Glu Gly Val Arg Ser Glu Asn Thr Pro Lys Val
 35 40 45
 Thr Ser Ser Gly Asp Glu Val Asp Glu Tyr Ile Lys Lys Met Leu Ser
 50 55 60
 Glu Ile Gln Leu Asp Lys Arg Lys His Thr His Asn Phe Ala Leu Asn
 65 70 75 80
 Leu Lys Leu Ser Arg Ile Lys Thr Glu Tyr Leu Tyr Lys Leu Lys Val
 85 90 95
 Asn Val Leu Glu Glu Lys Ser Lys Ala Glu Leu Thr Ser Lys Thr Lys
 100 105 110
 Lys Glu Val Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr Leu Lys
 115 120 125
 Leu Gly Glu Lys Val Ala Glu Ala Gln Lys Lys Val Glu Glu Ala Lys
 130 135 140
 Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp His Arg Asn Tyr Pro Thr
 145 150 155 160
 Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Lys
 165 170 175
 Val Lys Glu Ala Glu Leu Glu Leu Lys Glu Glu Ala Lys Thr Arg
 180 185 190
 Asn Glu Asp Thr Ile Asn Gln Ala Lys Ala Lys Val Lys Ser Glu Gln
 195 200 205
 Ala Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Gln Ala
 210 215 220
 Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Glu Lys Ala Glu
 225 230 235 240
 Glu Ala Lys Arg Lys Ala Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 245 250 255
 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 260 265 270
 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa

275

280

285

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Glu Ile Ala Glu Ser Asp
 290 295 300
 Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys
 305 310 315 320
 Glu Ser Arg Asn Glu Glu Lys Val Lys Gln Ala Lys Ala Lys Val Glu
 325 330 335
 Ser Lys Gln Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg
 340 345 350
 Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys
 355 360 365
 Val Lys Glu Lys Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Pro Gln
 370 375 380
 Pro Glu Lys Pro Ala Pro Ala Pro Lys Pro Glu Asn Pro Ala Glu Gln
 385 390 395 400
 Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln Ala Glu Glu Asp Tyr Ala
 405 410 415
 Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu Thr Gln Gln Gln Pro Pro
 420 425 430
 Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr Pro Lys Thr Gly Trp Lys
 435 440 445
 Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp Gly Ser Met Ala
 450 455 460
 Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
 465 470 475 480
 Gly Asp Met Ala Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr
 485 490 495
 Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Asn Asn Gly
 500 505 510
 Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu
 515 520 525

1028462_1.TXT

Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala
 530 535 540

Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser
 545 550 555 560

Gly Ala Met Lys Ala Ser Gln Trp Phe Lys Ala Ser Asp Lys Trp Tyr
 565 570 575

Tyr Val Asn Gly Ser Gly Ala Leu Ala Val Asn Thr Thr Val Asp Gly
 580 585 590

Tyr Gly Val Asn Ala Asn Gly Glu Trp Val Asn
 595 600

<210> 318

<211> 507

<212> PRT

<213> Streptococcus pneumoniae

<220>

<221> MISC_FEATURE

<222> (223)..(272)

<223> Xaa represents undefined/missing amino acids due to unavailable sequencing information.

<400> 318

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Met Gly
 20 25 30

Ser Val Val His Ala Thr Glu Lys Glu Val Thr Thr Gln Val Ala Thr
 35 40 45

Ser Ser Asn Lys Ala Asn Lys Ser Gln Thr Glu His Met Lys Ala Ala
 50 55 60

Lys Gln Val Asp Glu Tyr Ile Lys Lys Lys Leu Gln Leu Asp Arg Arg
 65 70 75 80

Lys His Thr Gln Asn Val Gly Leu Leu Thr Lys Leu Gly Val Ile Lys
 85 90 95

Thr Glu Tyr Leu His Gly Leu Ser Val Ser Lys Lys Lys Ser Glu Ala
 100 105 110

Glu Leu Pro Ser Glu Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu Gln
 115 120 125

1028462_1.TXT

Phe Lys Lys Asp Thr Leu Pro Thr Glu Pro Gly Lys Lys Val Ala Glu
 130 135 140
 Ala Glu Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys
 145 150 155 160
 Glu Lys Asp Leu Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu
 165 170 175
 Leu Asp Ile Ala Glu Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu
 180 185 190
 Leu Val Lys Gly Ser Tyr Arg Asn Leu Glu Thr Arg Lys Lys Leu Ile
 195 200 205
 Lys Gln Ser Glu Lys Leu Arg Ile Lys Lys Leu Met Leu Gln Xaa Xaa
 210 215 220
 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 225 230 235 240
 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 245 250 255
 Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 260 265 270
 Val Gln Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp Gly Ser Met Ala
 275 280 285
 Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ser Asn
 290 295 300
 Gly Ala Met Ala Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr
 305 310 315 320
 Leu Asn Ser Asn Gly Ala Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly
 325 330 335
 Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Phe
 340 345 350
 Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala
 355 360
 Thr Gly Trp Phe Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
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370

375

Gly Asp Met Ala Thr Gly Trp Phe Gln Tyr Asn Gly Ser Trp Tyr Tyr
385 390 395 400

Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly
405 410 415

Ser Trp Tyr Tyr Leu Asn Ser Asn Gly Ala Met Val Thr Gly Trp Leu
420 425 430

Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ser Met Ala
435 440 445

Thr Asp Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser
450 455 460

Gly Ala Met Lys Ala Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr
465 470 475 480

Tyr Val Asn Gly Ser Gly Ala Leu Ala Val Asn Thr Thr Val Asp Ser
485 490 495

Tyr Arg Val Asn Ala Asn Gly Glu Trp Val Asn
500 505

<210> 319
<211> 36
<212> PRT
<213> Mus musculus

<220>
<221> PEPTIDE
<222> (1)..(36)
<223> Peptide derived from mouse cathelin

<400> 319

Arg Leu Ala Gly Leu Leu Arg Lys Gly Gly Glu Lys Ile Gly Glu Lys
1 5 10 15

Leu Lys Lys Ile Gly Gln Lys Ile Lys Asn Phe Phe Gln Lys Leu Val
20 25 30

Pro Gln Pro Glu
35